Robustness across the board
Bay station controllers in the electrical power supply must withstand special environmental requirements, especially when the station automation is used in high-voltage equipment, strongly vibrating or shock generating system components as well as environments with a seismic risk. BCU 50 sets the standards here. The modular bay station controller in the robust rack is designed for longlasting reliability, the greatest ease of use and fast commissioning with high IT security according to the BDEW whitepaper. In different installation versions the system offers high flexibility through a wide selection of communication interfaces and highly resilient input/output modules. It is designed for use in locations such as power stations and medium voltage stations "G", high-voltage switchgears "H" as well as for signal and field connections "f" and high-voltage connections "h" according to IEC 61850-3.

Typical application areas
• Station and bay controller in medium and high-voltage switchgears
• Gateway and communication router between station buses, field bus and control systems
• Monitoring and control unit for the utilities, waste management and manufacturing industry

Brief profile net-line BCU-50
Extremely robust field device for modular assembly with interfaces and input/output cards in 7/14 slots. Direct linking of process signals, commands, metered values, measurands, set points, transformer taps, 1/n command termination and flexible data routing within the network. Cascadable up to 16 module frames. Up to 6 separate Ethernet network segments with VPN tunnel from the station, integrated switches each with 4x10/100BaseTx or fibre optic 100BaseTx with IEC 61850 station bus, IEC 60870-5-104 control centre coupling, DNP3, SYM² meter connection. Up to 4 serial interfaces with IEC 60870-5-10x protocol, DNP3, IEC 60870-5-103 protective device coupling, IEC 62056-21 meter connection or external field devices with field buses, Modbus and MPI. 19" DIN top-hat rail and wall-mounting.
net-line BCU-50 hardware

The modular system can be expanded according to individual requirements and has impressive functionality while being simple to use:
- CPU series5e with 1200 MIPS, 1 GB memory (512 MB SDRAM, 512 MB SLC Flash)
- High performance for integration complying with BDEW whitepaper
- Large selection of expansion modules
  - Communication modules
  - Signal/command modules
  - Measurement/set point modules
- Compatible with expansion modules of previous versions
- LAN integration of up to 6 separate network segments
- High noise immunity, high isolation class
- Up to 16 racks cascadable to a logical station
- Up to 28 links to protection devices via integrated FO-starcoupler

Communication channels

A particular strength of the series5 products lies in the large selection of communication possibilities and the redundant backup of routes, stations or process data. Links can be made via numerous protocols directly to the control system or in a controlled manner with telecontrol interfaces.

A connection of the BCU-50 to the IED (Intelligent Electronic Device) as protective devices in the IEC61850 network is of course possible. From setit V5.004 the BCU-50 can be used itself as an IED via IEC 61850 server, e.g. as a remote IO controller.

Voltage and shock-resistant

The BCU-50 has been consistently developed towards the product standard DIN EN 61850-3 (communication system for automation in the electric power supply) for the highest class of high voltage switchgears "H" and connections "h" which also cover the other areas. Therefore, the voltage resistance of 2.5 kV AC/3.5 kV DC and 5 kV surge also conforms to the VW3 class according to IEC 60870-2-1.

With a vibration resistance of 10 m/s² according to DIN EN 60068-2-6 and a shock resistance of 15 g (150 m/s²) and a continuous shock load of 10 g with a stress immunity of 6000 shocks in accordance with IEC 60068-2-27, the system is able to withstand a good deal. In order to withstand the mechanical stresses in areas exposed to the risk of earthquake as well, the system can also tolerate seismic vibrations up to 3.5 mm in accordance with EN 60255-21-3 (measuring relays and protection equipment) in each axis.

Recommended Area
net-line BCU-50

Source: in style of IEC/TS-61000-6-5:2001, image 3
**Intuitive parameterisation:**
Convenient integration of complex features:
- Syntax checks to prevent input errors
- Fault analysis with link to error source
- Practical copy functions
- Context-sensitive online help functions
- Calculation values and logic functions
- Extensive diagnostic functions
- Integrated project documentation
- Easy implementation of high IT security

**CPU modules**

**CPU-5C**
RISC processor core, 400MHz@400 MHz, MMU, 512 MB memory, encryption engine, 1.5 kV AC isolation for USB & LAN

**Power supplies**

SV-6-48
24 / 48 V DC ±15%, 1.5 kV AC isolation input/output
overload, dyn. undervoltage control with switch interlock

SV-6-60
as SV-6-48 but 24 / 60 V DC ±15%

SV-6-110
80...132 V DC, 2.5 kV AC isolation input/output
overload, undervoltage control with switch interlock below 93 V

SV-6-220
170...255 V DC, 2.5 kV AC isolation input/output
overload, undervoltage control with switch interlock below 180 V

**Information inputs**

16OE-6
16 signal inputs for connections with circuit breakers
wide range inputs 24...60 V DC / 110 V DC / 220 V DC
switching threshold ON at 80%, 5 kV surge voltage signal/logic (S/L) according to IEC 61850-3 (fn) and EN 60870-2-1 class V/W3

**Relay command outputs**

12RA-1
12 power relays 220 V DC, 1000 VA on, 5 A cont., 30 A 0.5 s
5 kV surge voltage signal/logic (S/L), protection class II

EVU2-O
1.5-pole command termination with 1-of-n monitoring, individual coil resistance, tolerance, post command lag time, operating delay suppression, external measurement circuit: 100Ω - 20 kΩ 1.5-pole command termination with 1-of-n monitoring, individual coil resistance, tolerance, post command lag time, operating delay suppression, external measurement circuit: 100Ω - 20 kΩ as EVU-2-O-1 with external measurement circuit: 1 kΩ - 100 kΩ as EVU-2-O-2 with external measurement circuit: 1 kΩ - 100 kΩ

**Measurements**

8AE16-3
8 analogue inputs, 16 bit, multi-range ±20±10±5±2.5 mA per channel (overload/underflow ±110%, isolated, insul. 3 kV DC)

**Set point outputs**

8A816-3
8 analogue outputs, 16 bit, isolation 3 kV DC, selection by channel 0(4)...20 mA or 0...10 V

**Interfaces**

SVWI-6
Switch FO 100BaseFx, mono-mode SC/ST mirroring and 10/100BaseTx, RJ-45, auto neg., auto-MDIX, isolation 1.5 kV AC as SWI-16 FO single-mode SC/ST up to 32 m, port mirroring

RS-485-5
EIA-485 symmetrical, max. 115 kBit/s, 1.2 km

RS-422-2
EIA-422 symmetrical, max. 115 kBit/s, 1.2 km

LWL-2
Starcoupler serial with 2 FO media converters per device, 38.4 kBit/s

**BCU-50 software**
Our innovative and well-established setIT parameterisation software allows exceptionally fast setup. The integrated codeIT soft PLC offers additional flexibility and allows many kinds of PLC programs to be implemented. A link to the OPC server can be realised by connectIT. The perfect solutions for station control systems, telecontrol technology or plant automation can be provided in this way.

**General BCU-50 system cards**

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<th>Power supplies</th>
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<th>Combination and special cards</th>
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<td>OERA-5</td>
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**Interfaces • Dedicated line**

SVWI-5
4-port Ethernet switch with 10/100BaseTx, 4 * RJ-45, port mirroring auto negotiation, auto-MDIX, isolation 1.5 kV AC additional LAN segment over internal USB connection

SWI2-1
4-fold RJ-45 Ethernet Switch as SWI-1-5 additional LAN segment over internal USB connection

glass fibre/FO and 1-way Ethernet Switch as SWI-1-6

SWI2-3
as SWI2-2 FO single-mode SC/ST up to 32 km, port mirroring

**BBM-1**
Baseband max. 19.2 kBit/s, 10 km, up to 8 subscriber

**WT12**
WT modem, R6TTE, FXS 1.2 kBit/s, max. 30 km, up to 17 subscriber

**WT96**
WT comp., 9.6 kBit/s, 2-/4-wire max. 20 km, up to 17 subscriber

**V24-2**
EIA/RS-232, max. 57.6 kBit/s, point-to-point

**V24-3**
RS-232/422 redundancy multipoint-point, max. 115 kBit/s

**V24-4**
RJ-45 acc. to ETSI EN 392-300-35, max. 115 kBit/s, point-to-point

**RS-485-3**
EIA-485 symmetrical, max. 115 kBit/s, 0.8 km auto-keying

**Interfaces • Switched line**

WM336-3
PSTN modem up to 33.6 kBit/s (V.34/V42.bis), isolation 1.5 kV AC

**WM336-4**
PSTN modem up to 33.6 kBit/s (V.34/V42.bis), isolation 3 kV

**GS-2**
GSM/GRS Quad-Band, 9600 Bit/s/115 kBit/s (V.32/V110)

**Isolation resistance**
2.5 kV AC signal/logic acc. to IEC 60870-2-1 VW3 except where indicated otherwise.

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Technical data: net-line BCU-50

Design
Modular bay station controller for substation automation, cascadable
BCU-50-M: V2A/alloy module frame with 7 slots
BCU-50-L: V2A/alloy module frame with 14 slots

Configuration
Example: Max. input/output expansion
14 I/O slots (up to 224 dedicated I/O), 2 Ethernet 10/100 Base-Tx auto-MDIX
Example: max. communication
6 switches integrated of 4 RJ-45 10/100 Mbit/s or FO ST/SC 100 Mbit/s + RJ45
4 serial interfaces, 8 E/A slots (up to 128 dedicated I/O)
28 FO-links serial as star coupler e.g. to protection devices

Input/output
Selection of 50 plug-in cards for: Single-/double-point, transformer step indica-
tions, measurands and integrated totals, single/double commands (1.5/2-pole),
command termination, 1 of n monitoring, set-point values, integrated total outputs

Protocols
IEC 61850 client/slave · IED and protective device coupling
IEC 60870-5-101 · telecontrol technology, station control technology
IEC 60870-5-103 · protective device coupling
IEC 60870-5-104 · TCP/IP coupling to control centre
DNF3 master/slave · serial /TCP
IEC 62056-21 · meter connection (IEC 1107)
SML · SYMP meter connection via Ethernet
DSG · Digital interface for gas measuring devices
Modbus RTU/TCP · master/slave, fieldbus MPI/3964/RK512
SNMP · network management, NTP/SNTP/DCF clock synchronisation
VPN tunnel · IPsec (IKEv1/IKEv2), OpenVPN
Syslog-ng
LDAP- and RADIUS

PLC programming
IEC 61131-3 compatible via codeIT, 128 kb program memory

CPU-SE series 5e
RISC-Processor Cortex-A8, 1200 MIPS@800 MHz, FPU, Watchdog, real-time clock
1 GB memory (512 MB SDRAM, 512 MB SLC Flash)

Memory expansion:
1 GB SD card (up to 8 GB in perspective)

Real-time clock
Errors max. ±10 ppm in operation, maintenance-free buffer ±20 ppm 60 days
@25°C, daylight saving time changeover, leap year correction

Status displays
Process status of the PLC,
CPU: 12 LEDs in front panel, green, red for system, communication, VPN
I/O cards: Card error, status LED of process data (binary)
interfaces: Send and momentary contact signals depending on card type
Optional: visIT plant visualisation

Service interface
Ethernet LAN 10/100 Base-Tx, auto-MDIX,
USB device, USB 2.0 host 12 Mbit/s (configuration/archive via stick)

Supply voltage
24 / 48 / 60 / 110 / 220 V DC, max. 40 W
Power-Fail management, failure bypass typ. 50 ms,
monitoring of supply voltage (lockout below 85%) and overload
redundant supply with separate feed optional

Electrical Safety
Protection class I, clearance/creepage dist. acc. EN 60225-27, overvoltage cat.III
5 kV surge voltage 3.5 kV DC test voltage acc. to Class W3 EN 60870-2-1

Standards
EMC immunity: IEC 61850-3 (H/h), EN 62055-26,
EN 61000-4-2, -3, , -4, /-5, -6, -8, /-9, /-16, /-17, /-18, /-29
EMC transient emissions: IEC 61850-3, EN 55022 /CISPR22 device class A
Vibration: EN 60870-2-2, EN 60225-21-1, IEC 60068-2-6 1 g
Shock: EN 60870-2-2, EN 60225-21-2, IEC 60068-2-27 15 g 11 ms /2-29 10g 6 ms
Earthquake: EN 60870-2-2, EN 60225-21-3 3.5 mm 1 g
Environment: IEC 61850-3, IEC 60686-2-1/-2/-30/-78, EN 60721-3-3 class 3C1

Housing
BCU-50 rack, plastic V2A metal, IP30
BCU-50-M: DIN-rail, wall-mount, dimensions 280 x 193 x 135 mm (WxHxD)
BCU-50-L: 19" rack, wall-mount, dimensions 483 x 193 x 135 mm (WxHxD)

Terminals
MSTB screw-type terminal or Combicon spring-type terminal, 0.2...2.5 mm²

Environment
-20 to +70°C, 024h max. 55° C, max. 3000 m above sea level,
humidity < 95%, without condensation

Product variants & accessories

BCU-50-L
14 slots
224 digital I/O*, 112 analogue I/O*
6 LAN segments*

BCU-50-L-W
as BCU-50-L with wall-mounting (T = 165 mm)

BCU-50-M
7 slots
112 digital I/O*, 56 analogue I/O*
6 LAN segments*

BCU-50-x-W
as BCU-50-x with wall-mounting (T = 165 mm)

BCU-50-twin
Two BCU-50-M with a 19" wall-mounting

Cable clamping tray BCU-50
Cable strain relief (H + 37 mm)

* Max. values only apply to limited extent, as some exten-
sions use identical resources.

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