

SAE-BCU-50

ROBUST SUBSTATION AUTOMATION

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 controllers in medium and high-voltage switchgear
- Gateway and communication router between station buses, field bus and control systems
- Monitoring and control unit for utilities, waste management and manufacturing industry

KEY PROPERTIES :

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

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.



- 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

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

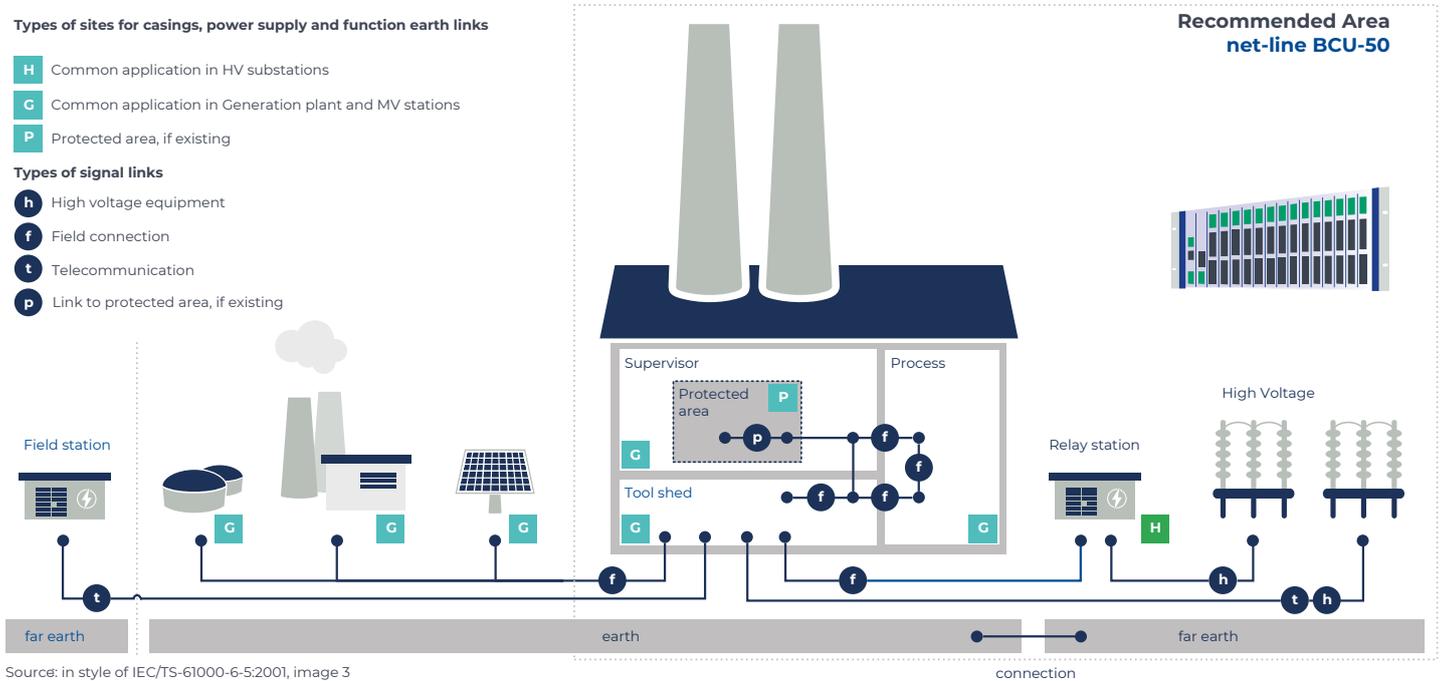
61850
approved

Types of sites for casings, power supply and function earth links

- H** Common application in HV substations
- G** Common application in Generation plant and MV stations
- P** Protected area, if existing

Types of signal links

- h** High voltage equipment
- f** Field connection
- t** Telecommunication
- p** Link to protected area, if existing



Source: in style of IEC/TS-61000-6-5:2001, image 3

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.

TECHNICAL DATA

Main functions	Details
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 10/100BaseTx 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 starcoupler e.g. to protection devices
Input/Output	Selection of 50 plug-in cards for: Single-/double-point, transformer step indications, 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 center DNP3 master/slave · serial / TCP IEC 62056-21 · meter connection (IEC 1107) SML · SyM ² -meter connection via Ethernet DSfG · Digital interface for gas measuring devices Modbus RTU/TCP · master/slave, field bus MPI/3964R/RK512 SNMP · network management, NTP/SNTP/DCF clock synchronizaiton VPN-Tunnel · IPsec (IKEv1/IKEv2), OpenVPN Syslog-ng LDAP- and RADIUS
PLC programming	IEC 61131-3 compatible via straton or codeIT, 128 kB program memory
CPU-5E series5e	RISC-Prozessor Cortex-A8, 1200MIPS@800 MHz, FPU, Watchdog, real-time clock 1 GB memory (512 MB SDRAM, 512 MB SLC Flash)
Speichererweiterung	1 GB microSD 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 display	Process status of the PLC, CPU: 12 LEDs in front panel, green, red I/O cards: Card error, status LED of process data (binary) Interfaces: Send and momentary contact signals depending on card type Optional: visIT plant visualization
Service interface	Ethernet LAN 10/100BaseTx, auto-MDIX, USB device, USB 2.0 host 12 MBit/s (configuration/archive synchronization 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 60255-27, overvoltage cat. III 5 kV surge voltage 3,5 kV DC test voltage acc. to Class VW3 EN 60870-2-1
Standards	EMC immunity: IEC 61850-3 (H/h), EN 60255-26, 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 60255-21-1, IEC 60068-2-6 1 g Shock: EN 60870-2-2, EN 60255-21-2, IEC 60068-2-27 15 g 11 ms /2-29 10g 6 ms Earthquake: EN 60870-2-2, EN 60255-21-3 3.5 mm 1 g Environment: IEC 61850-3, IEC 60068-2-1, /-2, /-30, /-78, EN 60721-3-3 class 3C1 3S1
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 mm ²
Environment	-20 to +70° C, Ø24h max. 55° C, max. 3000 m above sea level, humidity < 95%, without condensation

Overview of extension modules

Modules in IEC 61850-3 type test

CPU modules

CPU-5E RISC processor core, 1200 MIP @ 800 MHz, FPU, 1 GB memory, 1.5 kV AC isolation for USB & LAN

Power supplies

SV-6-48 24 / 48 V DC $\pm 15\%$, 1.5 kV AC isolation input/output
overload, dyn. undervoltage control with switch interlock
as SV-6-48 but 24 / 60 V DC $\pm 15\%$

SV-6-60 80...132 V DC, 2.5 kV AC isolation input/output
overload, undervoltage control with switch interlock below 93 V SV-6-

SV-6-110 170...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 (h) & EN 60870-2-1 class VW3

EVU2-1 Checkback indication card for command termination with EVU2-0
wide range inputs 18...72 V DC/60...110 V DC/220 V DC,
common roots

Relax and 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 1.5-pole command termination with 1-of-n monitoring,
16 single/8 double commands, command and release relays,
individual coil resistance, tolerance, post command lag time,
operating delay suppression, ext. measurement circuit: 100 Ω - 20 k Ω

EVU2-O-2 2-pole command termination with 1-of-n monitoring,
8 single/4 double commands, command and release relays,
individual coil resistance, tolerance, post command lag time,
operating delay suppression, ext. measurement circuit: 100 Ω - 20 k Ω
as EVU2-O-1 with external measurement circuit: 1 k Ω - 100 k Ω

EVU2-O-3 as EVU2-O-2 with external measurement circuit: 1 k Ω - 100 k Ω

EVU2-O-4 as EVU2-O-2 with external measurement circuit: 1 k Ω - 100 k Ω

Measurand inputs

8AE16-3 8 analog inputs, 16 bit, multi-range $\pm 20/\pm 10/\pm 5/\pm 2.5$ mA per channel
overflow/underrun $\pm 110\%$, isolated by channel, isolated 3 kV DC

Set point outputs

8AA16 8 analog outputs, 16 bit, selection by channel 0(4)...20 mA or
0...10 V, isolation 3 kV DC

Interfaces

SWI1-6 Switch FO 100BaseFx, mono-mode SC/ST mirroring and
10/100BaseTx, RJ-45, auto neg., auto-MDIX, isolation 1.5 kV AC
as SWI1-6 FO single-mode SC/ST up to 32 km, port mirroring

SWI1-7 EIA-485 symmetrical, max. 115 kBit/s, 1.2 km

RS-485-2 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, 38.4 kBit/s

General BCU-50 system cards*

Power supplies

SV-6-24 24 V DC $\pm 25\%$, no galv. isolation
overload, dyn. undervoltage control with switch interlock

Optocoupler inputs

16OE-5 16 wide range inputs 18...72 V DC/60...130 V DC/150...240 V DC

16IE-5 16 fast wide range inputs from 250 μ s, 18...72/48...130 V DC

CNT1-3 8 counters 10 kHz, 8 messages 24 V DC

CNT1-5 8 counters 1 kHz, 8 messages 18...72 V DC/48...130 V DC

8OE-4-110 8 optocoupler inputs 110 V AC/DC

8OE-4-230 8 optocoupler inputs 230 V AC/220 V DC

Relay outputs

16RA-1 16 relays 230 V AC, 1 A, common root

16RA-3 16 relays 250 V AC, 1 A, isolated by channel

16OA-3-1 16 FET outputs 250 V, 130 mA, isolated by channel

16OA-3-2 16 FET outputs 100 V, 320 mA, isolated by channel

Combination & mixed cards

OERA-5 8 optocoupler inputs 18...72 V DC, common root
8 relay outputs 230 V AC, 1 A, common root

EVU-X Utility expansion card for cascading a utility command group
over several module frames, release and locking via closed ring, 1/2 card format

Interfaces - Dedicated line

SWI1-5 4 port Ethernet switch with 10/100BaseTx, 4 * RJ-45,
port mirroring auto negotiation, auto-MDIX, isolation 1.5 kV AC

SWI2-1 Additional LAN segment over internal USB connection
4-fold RJ-45 Ethernet Switch as SWI1-5

SWI2-2 Additional LAN segment over internal USB connection
glass fibre/FO and 1-way Ethernet Switch as SWI1-6

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 subscribers

WT12 WT modem, R&TTE, FSK 1.2 kBit/s, max. 30 km, up to 17 subscribers

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

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

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

V24-4 with RJ-45 acc. to ETSI EN 392-300-5, 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), isolated 1.5 kV AC

WM336-4 PSTN modem up to 33.6 kBit/s (V.34/V42.bis)

GSM-2 GSM/GPRS Quad-Band, 9600 Bit/s /115 kBit/s (V.32/V.110)

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

PRODUCT VARIANTS

BCU-50-M

7 slots
112 digital I/O, 56 analog I/O*
6 LAN segments*

BCU-50-M-W

as BCU-50-M with
wall mounting
(D = 165 mm)

BCU-50-L

14 slots
224 digital I/O, 112 analog I/O*
6 LAN segments*

BCU-50-L-W

as BCU-50-L with
wall mounting
(D= 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 extensions use identical resources..