Module Description

Procontrol P

Mechanical Components

Station- Bus Cabinet
For 2 redundant Stations Remote Bus (FDDI)
EMC-Version

89MS02/R5200

Application

The Station- bus cabinet is designed to house 2 redundant PROCONTROL stations (including the electric equipment of the active and the passive redundancy), each for a maximum of 49 PROCONTROL input, output, or processing modules. 2 subracks are provided per station.

The arrangement of the stations is shown in Figure 1. The PROCONTROL stations are coupled to the remote bus (FDDI).

This cabinet is intended for redundant power supply (see Figure 4).

Connection to the redundant remote bus is established with module 88TK50/R1220 in the form of single-channel circuitry.

The 88TR01 redundancy control module monitors the station and controls the redundancy changeover together with the redundancy control module of the other redundancy.

Description

The mechanical structure of this station-bus cabinet is shown in Figure 1.

For installation, maintenance, and operation purposes, the cabinet is accessible from the front and the rear. The cabinet is designed for natural cooling. The cooling air enters the cabinet from the front and rear through ventilation grids with filter mats in the doors and leaves it again through the roof plate which is of grid-type design (protection type IP30).

Each cabinet has a partition wall on the left side. For single-cabinet or row-type installations, the cabinet on the left end needs an additional side wall and the one on the right end needs a partition wall and a side wall.

The lock on the door is a built-in 3 mm two-way rod-type locking mechanism.

The cabinet is equipped with:

4 subracks, 24 inch wide, each for 26 electronic modules, utilisation is limited by the maximum power dissipation of the cabinet (see chapter on cabinet equipment) and a power supply module for power distribution.

Subracks A and D are part of redundancy A, and subracks G and K are part of redundancy B. The connecting pins of the female connectors for process modules on subrack A are wired to the pins of the female connectors on subrack G, and the pins of the female connectors on subrack D are wired to the female connectors on subrack K. The wiring is in parallel. The process cables are connected to the female connectors of redundancy B on subracks G and K.

The station-bus cabinet is intended to be installed in dry, clean and vibration-free areas of normal industrial design.

On the right side of the roof facing strips (front and rear), 4 borings are provided for attaching the cabinet designation plates. The plates are attached by means of 2.5x6mm grooved drive studs.
Figure 1: PROCONTROL Station-bus cabinet for 2 redundant stations with remote bus (FDDI)
Remote-bus coupling

**Figure 2:** Remote-bus coupling

Mechanical design

**Cabinet design**

The station-bus cabinet design is based on ABB’s MNS system. The cabinet has double-wing doors in the front and in the back provided with ventilation slots, a roof plate made of expanded metal, and a full-metal partition wall. The cabinets are suitable for row installations.

A50x75mm cable duct on the bottom frame on the cabinet rear allows cross-cabling from cabinet to cabinet. The partition wall has a suitable cut-out.

**Accessory parts**

For each cabinet in the case of single-cabinet installations or for each end cabinet in the case of cabinet-row installations, the following accessory parts need to be ordered additionally:

- For left-end cabinet
  1 side wall
- For right-end cabinet
  1 side wall and
  1 partition wall.
- For single cabinet
  2 side walls and
  1 partition wall.

Cabinet installation

The cabinet is installed on a base frame where the cables are introduced from below.

Floor mounting is done in the form of screw-type mounting. For this purpose, there is one boring per corner provided in the transverse sections.

For proper cabinet ventilation, free outlet of air from the roof plate is to be ensured; 20 cm minimum space required between roof plate and ceiling.

**Figure 3:** Floor mounting
Electrical design

Figure 4: Power supply, cabinet annunciation, and remote-bus coupling (FDDI)
Power supply

The station-bus cabinet receives a redundant 24V DC supply from two separate power supply systems. The power supply module is responsible for supply voltage monitoring, voltage limitation, circuit formation, and power distribution. For selective cabinet connection and disconnection, 2 high-capacity m.c.b.s are provided. As protective devices, they merely fulfil a back-up function and can respond selectively with respect to the external cabinet fuses.

The redundant 24V DC power supplies are kept separate and non-interfering up to each individual electronic module.

### Address setting

| Module slot  | 26 | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  |
|---------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Mounting      | 104| 100| 96 | 92 | 88 | 84 | 80 | 76 | 72 | 68 | 64 | 60 | 56 | 52 | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 08 | 04 |
| raster element| 104| 100| 96 | 92 | 88 | 84 | 80 | 76 | 72 | 68 | 64 | 60 | 56 | 52 | 48 | 44 | 40 | 36 | 32 | 28 | 24 | 20 | 16 | 12 | 08 | 04 |

**Sub-rack A**

| Address setting | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  |

**Sub-rack D**

| Address setting | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |

**Sub-rack G**

| Address setting | 25 | 24 | 23 | 22 | 21 | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  |

**Sub-rack K**

| Address setting | 57 | 56 | 55 | 54 | 53 | 52 | 51 | 50 | 49 | 48 | 47 | 46 | 45 | 44 | 43 | 42 | 41 | 40 | 39 | 38 | 37 | 36 | 35 | 34 | 33 | 32 |

Rear view of sub rack

*Fig. 5: Address setting*
**Address setting**

Throughout the PROCONTROL system, each electronic module is assigned a specific module address. This module address is determined by the mounting location of the module. For each sub rack, the module addresses are set by means of jumpers SRA and GTA5 on the identical 89IL07 station-bus p.c.b cf. Figure 5. The setting is done in the factory and must not be changed.

The station addresses are set on station-bus coupling module 88TK50.

**Screen and protective conductor**

In addition to the connections of the redundant power supply, each cabinet is equipped with a screen connection for the earthing of the cable screens of the process cables, and an earth connection for the earthing of the casing.

For process cables with foil screens, screen connection elements are provided which are connected directly to the cabinet frame. The tracing wires of the screens are to be connected to these elements in the shortest possible way (max. 5 cm).

**Annunciation system**

see Figures 1 and 4

In the 89NG08 power supply module, the individual cabinet signals are scanned and are put out as general signals for further annunciation purposes. On the front of monitoring unit A1 of the supply module, the following annunciations are provided:

Cabinet annunciation's

- Power supply A available USA
- Power supply B available USB
- Flashing voltage available BLS
- Lamp check TL (not used)
- Cabinet door open MTK (Optional)
- Cabinet temperature too high MTE

Station annunciation's

<table>
<thead>
<tr>
<th>Station</th>
<th>1 2 3 4</th>
</tr>
</thead>
</table>
- Supply m.c.b. off | MSP1 x x - - |
- Power supply disturbed | MSP2 - - - - |
- Power supply disturbed station-bus termination 1 | MSP3 x x - - |
- Power supply disturbed station-bus termination 2 | MSP4 x x - - |
- Electronic module disturbed | MST x x - - |
- Temperature fault | MTE x x - - |
optional for additional fans

x = connected
- = not used

For cabinet annunciation's, the following signal outputs are available:

- Cabinet disturbance, optional for cabinet-lamp H20 LMF
- Cabinet disturbance, optional for cabinet-row lamp H21 LMRA

For evaluation in a central annunciation system, for each of the 2 stations, the following general signals are put out on the bus via bus-coupling module 88TK50

- Cabinet door open (optional) MTKG
- Temperature fault MTEG
- Power supply okay (closed-circuit principle) MW

Bus-coupling module 88TK50 puts out signal MST to the power supply module in order to energise the cabinet and/or cabinet row lamp. Cabinet lamp H20 and/or cabinet row lamp H21 can be activated optionally. The disturbances are annunciated by light-emitting diodes on the front of the disturbed module. Signaling for bus terminations 88TB07 is done by light-emitting diodes of monitoring unit A1 on the front of the power supply module.
Terminal assignments

**Power supply**

Supply A, terminal strip X1, (Figure 4)
- 1,2 USA
- 3,4 ZA

Supply B, terminal strip X1, (Figure 4)
- 7,8 USB
- 5,6 ZB

Protective conductor PE, screw-type connection (Figure 4)
- PE

**Remote bus**

The optical-fiber conductors of the remote bus are connected directly to coupling modules 88TK50 (cf. Figure 1 and 4).

**Process cables**

The process cables are connected to signal distribution strips on the rear of the cable compartment. For this purpose, the standard version is provided with 50 rows of 8-pole connectors. The other 50 rows are used for connecting the input and output modules. Additionally, 88 terminal blocks (11 x 8) with screw-type and Termi Point connections are available for connecting solenoid valves.

**Options**

Door contacts, connector X6 (Figure 4)
- 2 MTK
- 1 UM

Cabinet lamp, connector X7 (Figure 4)
- 10 UM
- 11 TL
- 8 LMF
- 9 Z

Cabinet row lamp, connector X7 (Figure 4)
- 7 LMRA
- 5 Z
- 4 UM

Fan set on sub rack (Figure 4).
The connection is made by means of plug-in poles on station-bus p.c.b. 89IL07
- X203 USA
- X202 USB
- X201 Z
- X213 ML2

Tests and inspections

For quality assurance, each cabinet is inspected for completeness and proper mechanical functions.

An unequipped cabinet cannot be checked for proper electrical functions. Instead, a wiring inspection is carried out. The insulation resistance is tested according to the identical standards VDE 0160 or VDE 0660, part 500/IEC 439-1.
Cabinet equipment

In case all available slots are used for modules of elevated power dissipation values, the limit value for the permissible power dissipation at a max. ambient temperature for the cabinet may be exceeded. Above the permissible power dissipation values, an additional ventilation facility is required, cf. "Options".

Considering plant-specific factors of simultaneous operation and considering a supply voltage of 27 V at the module terminals, the cabinet may be equipped according to the table below without additional ventilation measures being required.

<table>
<thead>
<tr>
<th>Sub-</th>
<th>Slot</th>
<th>Module Type</th>
<th>No. of mod. station/cabinet</th>
<th>Room-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the case of any deviations from the pattern shown above, special attention is to be paid to even equipment arrangement and to the total power dissipation of the cabinet.
Options

To meet specific plant requirements optional solutions are available.

Protection type

The grid-type roof plate (IP30) can be provided with an additional full-metal protective sheet (IP31) or be replaced by another protective sheet (IP11). The height of the cabinet will then be 2,290 mm.

Door locks

The 3 mm two-way key lock can be exchanged for a 5 mm two-way key lock, catch-type or T-handle.

The rod-type lock for a 3 mm two-way key can be exchanged for a rod-type lock with a locking cylinder for 3 mm or 5 mm two-way key inserts, catch-type or T-handle.

Cabinet and cabinet row lamps

A cabinet lamp can be provided on the protection cabinet front for the annunciating of cabinet disturbances.

In addition to the cabinet lamp, a cabinet row lamp can be activated. This cabinet row lamp annunciates disturbances within a cabinet row and is mounted on the front side of a cabinet row.

Coatings

Upon request, special coatings of different shades or coat thickness may be applied.

Door contacts

The cabinet can be monitored for open doors by means of additional door limit switches. The limit switches are activated by the right door leaf of the double-wing door.

Additional ventilation

To provide for the discharge of elevated power dissipation values, the following possible additional ventilation solutions are available:

Additional ventilation with air suction facility

A roof plate allowing a ventilation duct to be attached, including various accessories, designed to connect the protection cabinet to a central ventilation system:

- Ventilation duct, complete to be attached to a cabinet row
- Ventilation duct, complete to be attached to a cabinet row including cloth nozzle in the top center for connecting a duct system
- Ventilation duct cover complete cover closing off the ventilation duct at the end of a cabinet row
- Ventilation duct cover with cloth nozzle complete cover for the ventilation duct closing off the ventilation duct at the end of a cabinet row plus connection to a duct system.

When the cabinet is retrofitted for being connected to an air suction facility, the rear cabinet doors need to either be sealed off against air inlet or replaced by closed doors with sealing strips.

Additional ventilation by means of a fan set

The fan set is designed to provide ventilation for the individual sub racks. The fan set is installed in the air inlet area of the sub racks. The electrical connection is established via plug-in connections at the 89IL07 station-bus p.c.b..

Figure 6: Fan set

Each fan is fused separately. The fans have an automatic restart function after a blocking has occurred. Standstill of a fan due to voltage failure or blocking of a fan wheel is monitored and signalled via a floating contact.
## Technical data

### Mechanical features

<table>
<thead>
<tr>
<th>Dimensions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>2200 mm (2290 mm with optional full-metal roof cover)</td>
</tr>
<tr>
<td>Width</td>
<td>900 mm</td>
</tr>
<tr>
<td>Depth</td>
<td>400 mm</td>
</tr>
<tr>
<td>Installation</td>
<td>Single-cabinet or cabinet-row installation with free access from the front and the rear side</td>
</tr>
<tr>
<td>Weight</td>
<td>Approximately 230 kg without modules installed</td>
</tr>
<tr>
<td>Protection type</td>
<td>IP30 (IP11, IP31 possible with optional roof covers)</td>
</tr>
<tr>
<td>Connections</td>
<td></td>
</tr>
<tr>
<td>Power supply (X1)</td>
<td>Screw-on terminals, 35 mm²</td>
</tr>
<tr>
<td>Remote bus (LWL)</td>
<td>SC Duplex connector at the front side of 88TK50</td>
</tr>
<tr>
<td>Process signals</td>
<td>To process modules</td>
</tr>
<tr>
<td>Cable screens</td>
<td>Voltage bus ZEP</td>
</tr>
<tr>
<td>of the process cables</td>
<td>6.3/2.8 mm plug-type connection flex up to AWG 20</td>
</tr>
<tr>
<td>Cabinet and cabinet rows</td>
<td>Combicon plug, Phönix MSTB 2.5/10-STF</td>
</tr>
<tr>
<td>disturbance lamp (X7)</td>
<td>5.08 screw-on terminal 2.5mm², plug is delivered with the cabinet</td>
</tr>
<tr>
<td>Fan set</td>
<td>Plug-in connector at connection pole 0.6 x 0.6 mm on station bus p.c.b. 89IL07. Connecting lines and plug-in connectors are part of the fan set</td>
</tr>
</tbody>
</table>

### Color

- Sheets, RAL 7032
- Profile sections, matt white

### Surface protection

- Profiles and cable compartment zinc-coated.
- Sheets with EC standard enamel with kiln-dried top coat.
- Visible outside elements with pulverized coating in addition to EC standard enamel. Minimum coat thickness 60 … 90µm.

### Ambient conditions

- Bearing temperature: -40 ... +70 °C
- Operating temperature: 0 ... +40 °C, DIN VDE 0160, IEC 68–2–2
- Relative humidity: DIN IEC 721–3–3, code letter 3K3, 5 ... 40 °C

### Power dissipation

- **Per cabinet**
  - when power dissipation is distributed rather evenly in the cabinet
    - up to 25 °C power dissipation = 640 W
    - 30 °C power dissipation = 525 W
    - 35 °C power dissipation = 420 W
    - 40 °C power dissipation = 310 W

- Additional ventilation with air suction in the case of room temperature
  - up to 25 °C power dissipation = 950 W, 140 m³/h
  - 30 °C power dissipation = 950 W, 185 m³/h
  - 35 °C power dissipation = 950 W, 265 m³/h
  - 40 °C power dissipation = 950 W, 530 m³/h

- **Per sub rack**
  - in the case of unsymmetrical distributed and/or higher power dissipation of the cabinet
    - Additional ventilation with fan set in naturally ventilated cabinet up to max. 300 W per sub rack
      - up to 25 °C and power dissipation > 150 W in the sub rack
      - 30 °C and power dissipation > 125 W in the sub rack
      - 35 °C and power dissipation > 100 W in the sub rack
      - 40 °C and power dissipation > 75 W in the sub rack
Electrical features

Power supply

Voltage  \( U_N = 24 \) V DC, tolerance at supply terminal 22.0 ... 30.0 V

Harmonics  \( \leq 5\% \) depending on connection to an unfiltered three-phase bridge connection

Over voltage

- 35 V / 500 msec
- 45 V / 10 msec
- 2 \( x U_N \) at \( T = 0.4 \) msec half-value duration (over voltage-strength class 2)

DIN VDE 0160 (draft)

Voltage variation

- during connection and disconnection \( \geq 0.2 \) V/msec
- during operation, 19.5 V up to 30.0 V Arbitrary

Admissible voltage-free interval

\( \leq 1 \) msec

Current  \( I_N = 32 \) A, depending on equipment installed

Starting current inrush  \( I = 10 \times I_N \), max. 3 msec (capacitor loading)

Back-up fuse  Max. 63 A gL

Min. short-circuit current  \( \geq 100 \) A at the cabinet supply terminals

Protective measures for power supply and process connections

Functional extra-low voltage with safety isolation, protective conductor connection for local equipotent bonding

Electrical environment

Electrostatic discharge

- 8 kV (air discharge)
- 4 kV (contact discharge)

DIN EN 61000-4-2, IEC 1000-4-2

Fast transients/pulses (burst)

- 2 kV

for power supply

DIN EN 61000-4-4, IEC 1000-4-4

Surge voltage

- 2/1 kV

for power supply

DIN EN 61000-4-5, IEC 1000-4-5

Scope of supplies

The Station Bus cabinet 89MS02/R5200 (order number GKWE 982 410 R5200) is supplied tested and ready for connection.

The scope of supplies does not include:
- The electronic modules to be mounted on the sub racks,
- Accessory parts and options according to the list given under „Ordering data“.

The scope of supplies does include:
- All fixed and wired electrical operational equipment,
- Fixing material of cabinet installation (screws, bolts, clamping straps, disks); delivered with the cabinet, separately packed.
- Bus-terminating resistors,
- Plugs in the signalling and annunciation circuit for connecting the power supply unit.

The data listed above apply to cabinets with PROCONTROL standard equipment.
### ORDERING DATA

<table>
<thead>
<tr>
<th>Description</th>
<th>Order number:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Station-bus cabinet 89MS02/5100, complete</td>
<td>GKWE 602 410  R5200</td>
</tr>
<tr>
<td><strong>Accessory parts</strong></td>
<td></td>
</tr>
<tr>
<td>For terminating a cabinet row and for single-cabinet installation</td>
<td></td>
</tr>
<tr>
<td>Partition wall and fixing material</td>
<td>GKWE 602 306  R0011</td>
</tr>
<tr>
<td>Side wall and fixing material</td>
<td>GLBK 300 022  R0001</td>
</tr>
<tr>
<td><strong>Options</strong></td>
<td></td>
</tr>
<tr>
<td>Door contacts for right door, front and back</td>
<td>GKWE 602 331  R0003</td>
</tr>
<tr>
<td>Incl. Mounting and wiring</td>
<td></td>
</tr>
<tr>
<td>Cabinet lamp incl. Mounting and wiring</td>
<td>GKWE 602 330  R0003</td>
</tr>
<tr>
<td>Cabinet row lamp incl. Mounting and wiring</td>
<td>GKWE 602 369  R0003</td>
</tr>
<tr>
<td>Special coats of paint (different shades and coat thickness)</td>
<td>Order in plaintext</td>
</tr>
<tr>
<td><strong>Optional exchange parts</strong></td>
<td></td>
</tr>
<tr>
<td>Rod-type lock two-way key, 5mm</td>
<td>GLBK 470 016  R0001</td>
</tr>
<tr>
<td>Rod-type lock, catch-type handle</td>
<td>GLBK 470 016  R0003</td>
</tr>
<tr>
<td>Rod-type lock, T-handle</td>
<td>GLBK 470 016  R0004</td>
</tr>
<tr>
<td>Rod-type lock for cylinder, 3mm two-way key</td>
<td>GLBK 470 016  R0018</td>
</tr>
<tr>
<td>Rod-type lock for cylinder, 5mm two-way key</td>
<td>GLBK 470 016  R0017</td>
</tr>
<tr>
<td>Rod-type lock for cylinder, catch-type handle</td>
<td>GLBK 470 016  R0019</td>
</tr>
<tr>
<td>Rod-type lock for cylinder, T-handle</td>
<td>GLBK 470 016  R0020</td>
</tr>
<tr>
<td>Roof cover (without grid)</td>
<td>GKWE 601 128  R0002</td>
</tr>
<tr>
<td>Spare filter mats</td>
<td>GKWE 601 879  P0001</td>
</tr>
<tr>
<td><strong>For optional additional ventilation with air-suction facility</strong></td>
<td></td>
</tr>
<tr>
<td>Double-wing door in the back, complete, without door lock to be exchange</td>
<td>GKWE 602 160  R0022</td>
</tr>
<tr>
<td>for air-suction application</td>
<td></td>
</tr>
<tr>
<td>Roof plate, complete for ventilation duct</td>
<td></td>
</tr>
<tr>
<td>* Ventilation duct, complete</td>
<td>GKWE 602 317  R0011</td>
</tr>
<tr>
<td>* Ventilation duct, complete with cloth nozzle</td>
<td>GKWE 600 843  R0001</td>
</tr>
<tr>
<td>* Ventilation duct cover</td>
<td>GKWE 600 843  R0002</td>
</tr>
<tr>
<td>* Ventilation duct cover, complete with cloth nozzle</td>
<td>GKWE 600 862  R0001</td>
</tr>
<tr>
<td>* Additional parts for roof plate with ventilation duct</td>
<td>GKWE 600 862  R0002</td>
</tr>
<tr>
<td><strong>For optional additional ventilation with fan set</strong></td>
<td></td>
</tr>
<tr>
<td>Fan set</td>
<td>GKWE 602 436  R0100</td>
</tr>
<tr>
<td>Technical data are subject to change without notice!</td>
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