Subracks (Crates) Type 6021 for LHC

Parts of the Unit:

Bin

Backplane

Modular Floating Power Supply

Intelligent Fan tray

Monitoring & remote control

CANbus & OPC server

Description

Bins

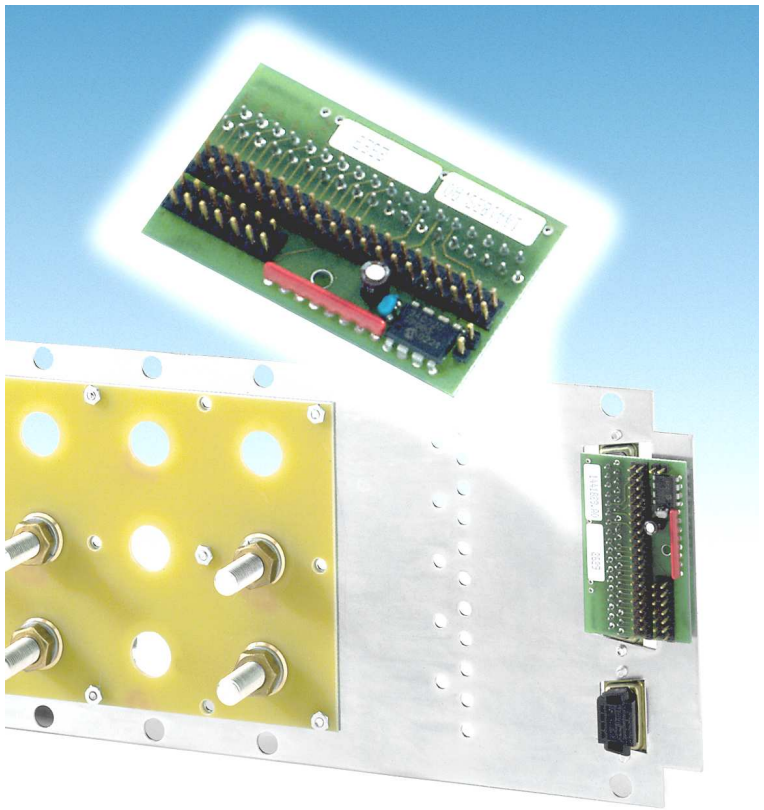
- Very rigid mechanical construction with 5mm side panels according to IEEE1101.1, 1101.10, 1101.11
- Additional transversal stiffing members, screwed to the module guides for heavy duty
- Stripline technology backplane VME 64x installed or customer specified ones
- Current distribution by **current- sheet- multilayer**, keeps cool even at highest currents

Bins

- **5mm side panel** powerful locked to the transversal members by allen-screws

- shaped for recessed mounting of front angles

Bins



- **P**ower **P**rotection **M**emory **PPM** situated behind connector board
- protects bin (and inserted modules) against incompatible power supplies.
- Memory for Crate- address
- **Optional**: Output voltage programming

Plug & Play

PPM Power Protection Memory

A Comparings

1. pin assignment of the power connectors

2. channel wise voltage levels being inside the “Status good” levels (default of thresholds Umin and Umax)

3. CANbus address with automatic setting to previous used when power supply has been changed

- incompatible power supply will not start

Plug & Play

- **A Comparings**
- Channel wise monitoring of over- or under voltage
- In other words:
  PPM compares power supply type sticker with those of the corresponding bin
- For test purposes disabling of Plug & Play logic is given (at power supply site via service instructions)

Plug & Play

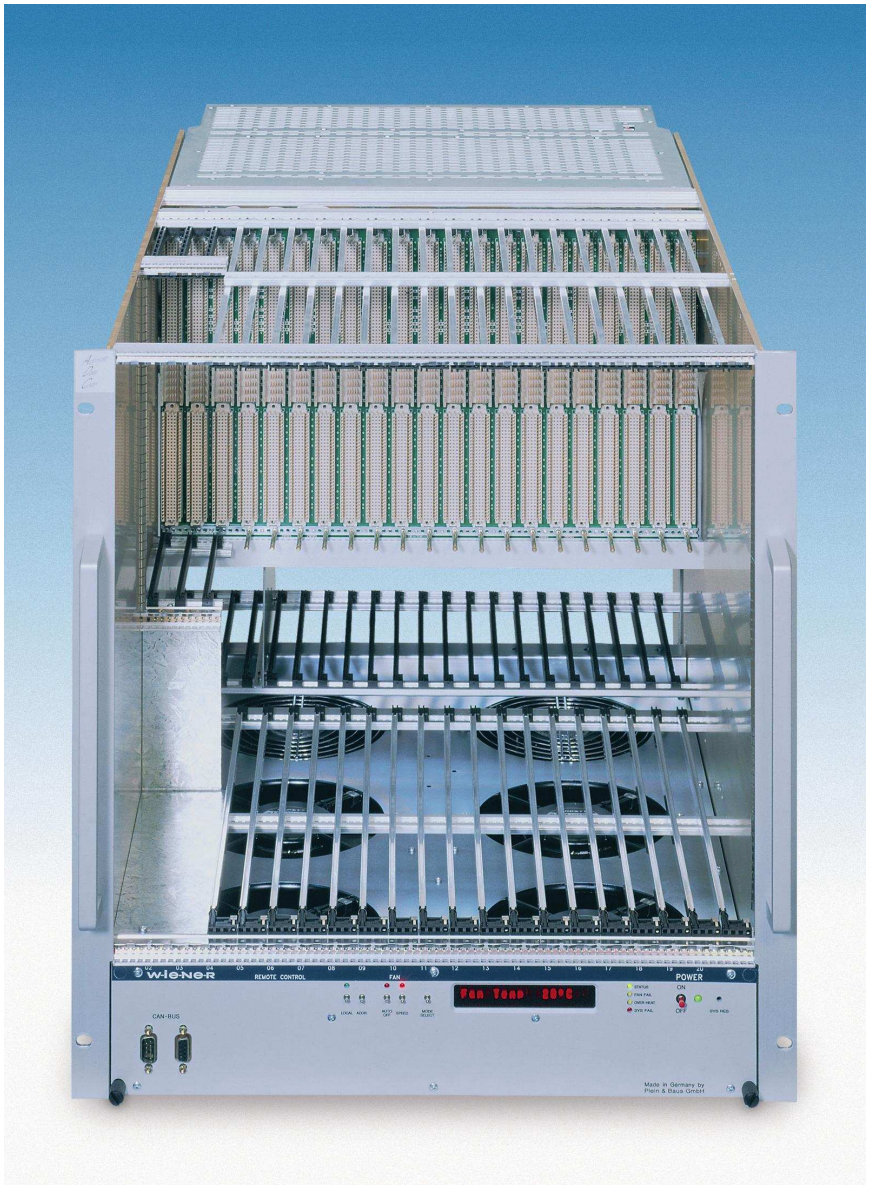
B Programming

- **Optional** feature, additional to the functions of A:
- 1. power supply adjustment to nominal voltages automatically (Unom)
- 2. crow-bar thresholds adjustment automatically (Uovp)

Plug & Play

B Programming

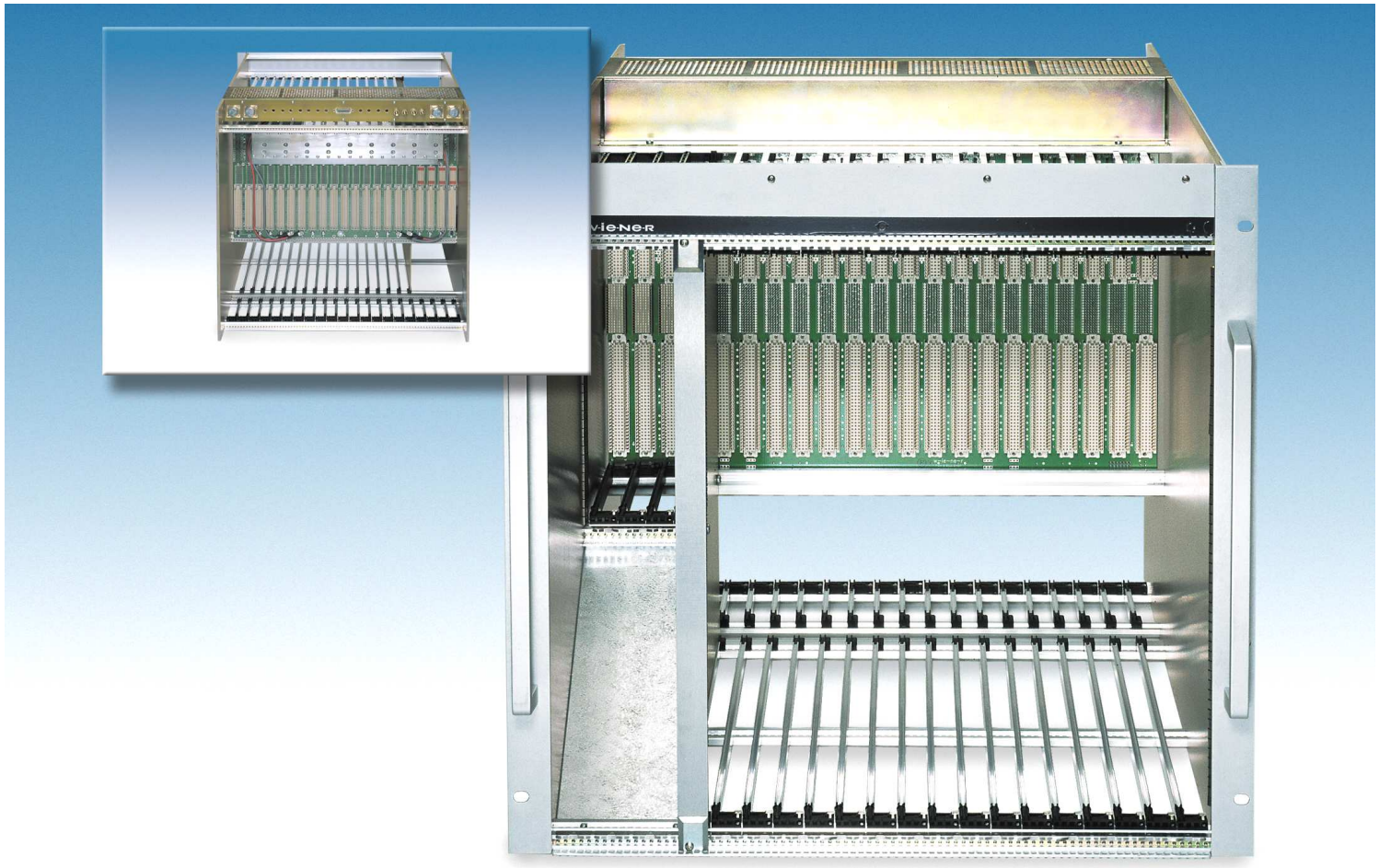
- A power supply which modules are able to deliver the requested voltages will be set to bin compatible outputs, happened immediately when the mains have been connected to that power supply.
- Default of this feature: disabled



Variant 2 - Bin

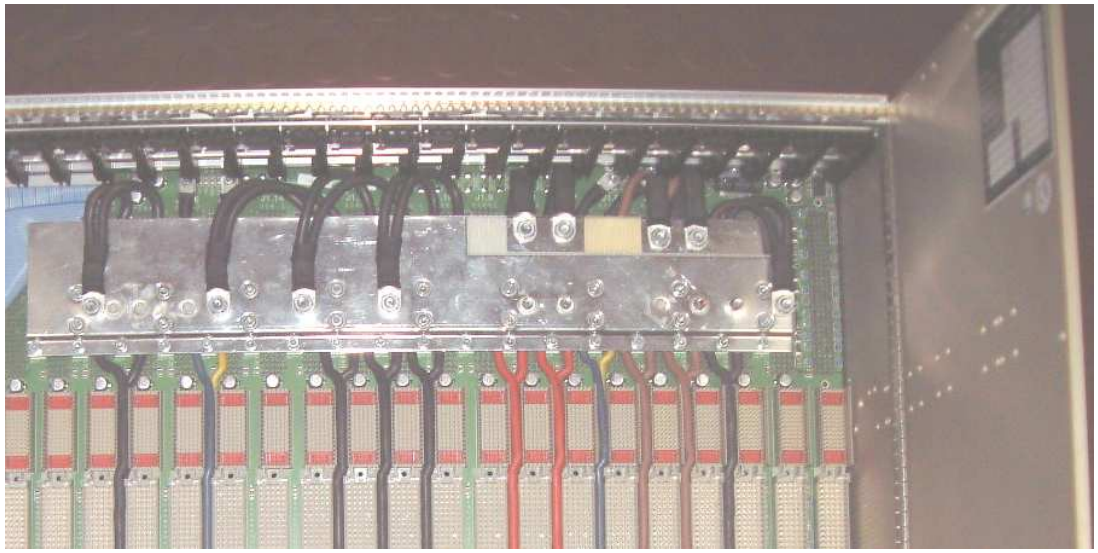
- LHC 9U Bin with 3-fold divider for 6U modules, 64x backplane J1/Jo/J2, J3 free
- 6-fold super blower intelligent fan tray with CANbus connectors
- Local power supply

Variant 1 Subrack 9U



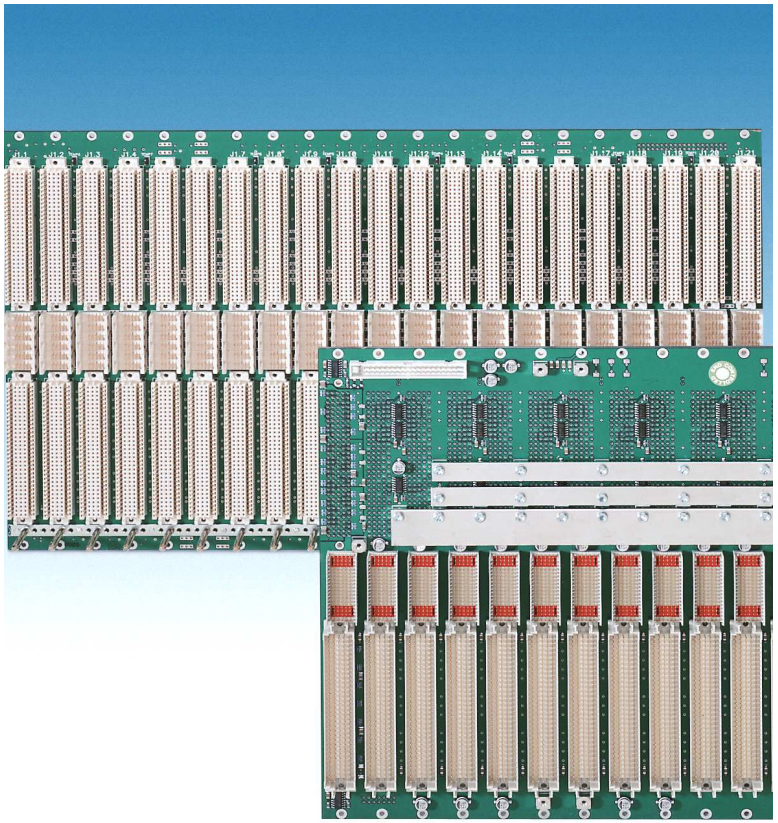
Bins, rear side

- Power connection to backplane via copper sheets
- formed as flat multilayer



Backplane 64x, 21 Slot

- 10 layers stripline technology
- Crostalk minimizing design
- 18 ground power-bugs,each for 60A, minimize DC ground shift
- Active automatic daisy chain
- 8 plugs for temperature sensors
  (automatic temp. watching of selected slots !)
- Custom backplanes should consider power bug positions! Ask for drawings



Backplane 64x

Response and Cross talk, Test conditions

Used driver: 74AC245

Channel A: Pin 15C, at Slot 1 (input)

Channel B: Pin 15C, at Slot 21 (check point)

Channel C: Pin 14C, 16C

Ref-GND: Pin 15A

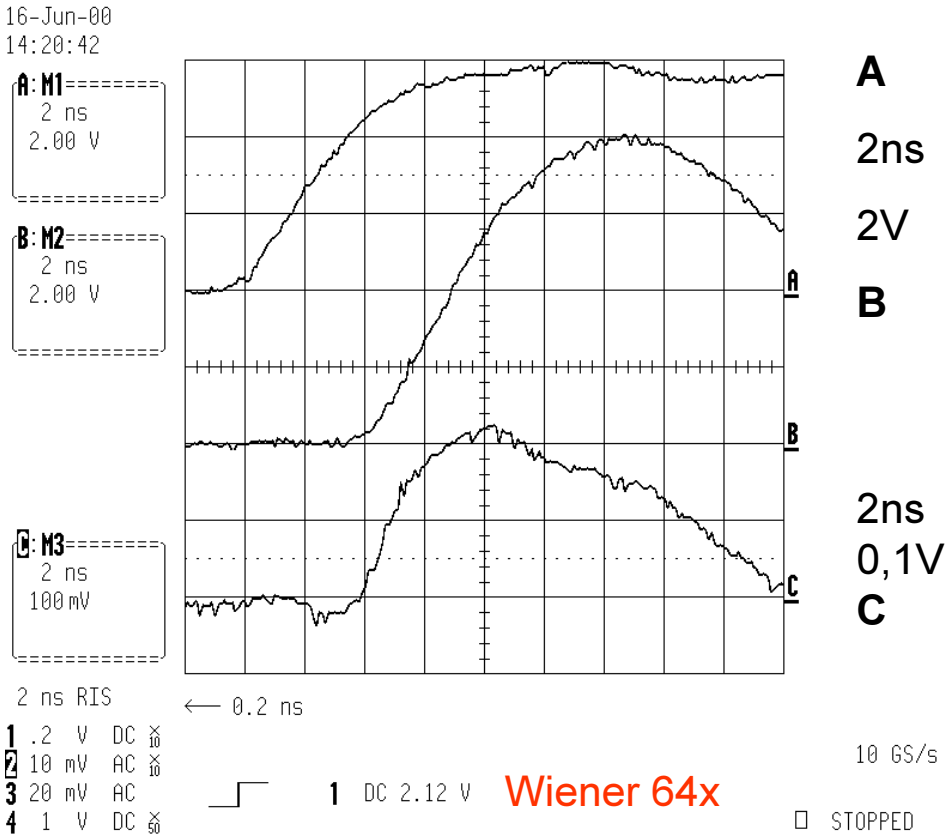
Backplane 64x

Response and Cross talk

Delay: 4ns

Rise time: 3ns / 4V

Cross talk: 220mV max.



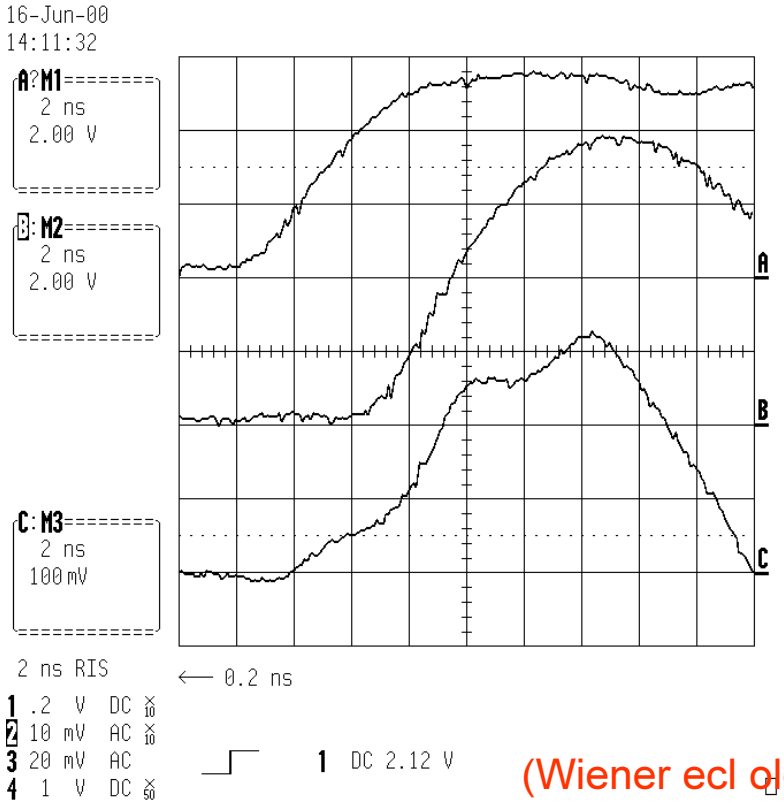
Backplane 64x

comparison with other backplanes

Delay: 4ns

Rise time: 3,4ns / 4V

Cross talk: 320mV max.



(Wiener ecl old)

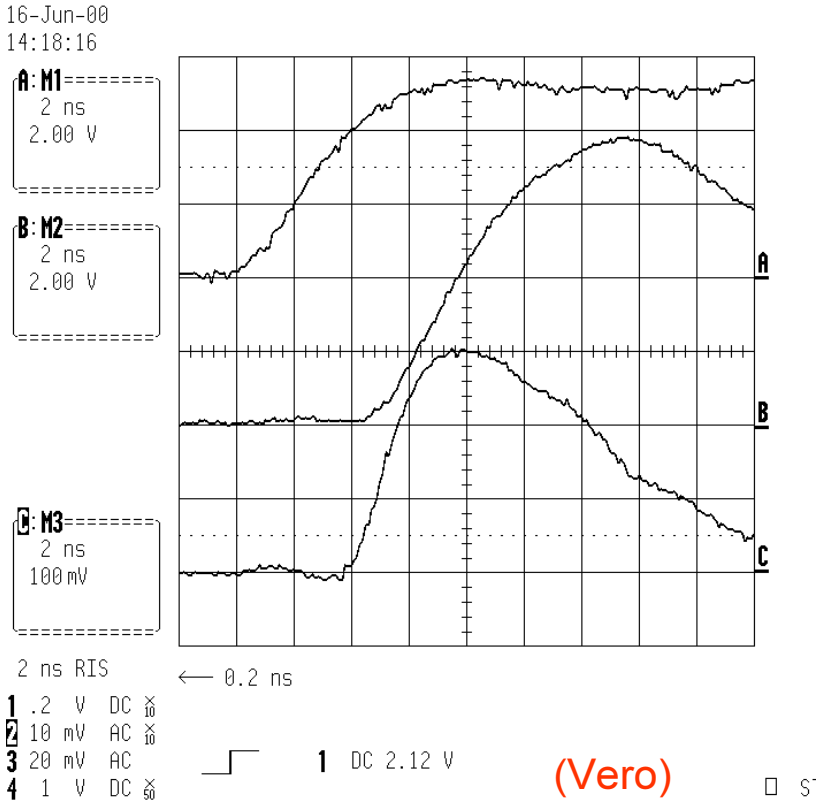
Backplane 64x

comparison with other backplanes

Delay: 4ns

Rise time: 3,6ns / 4V

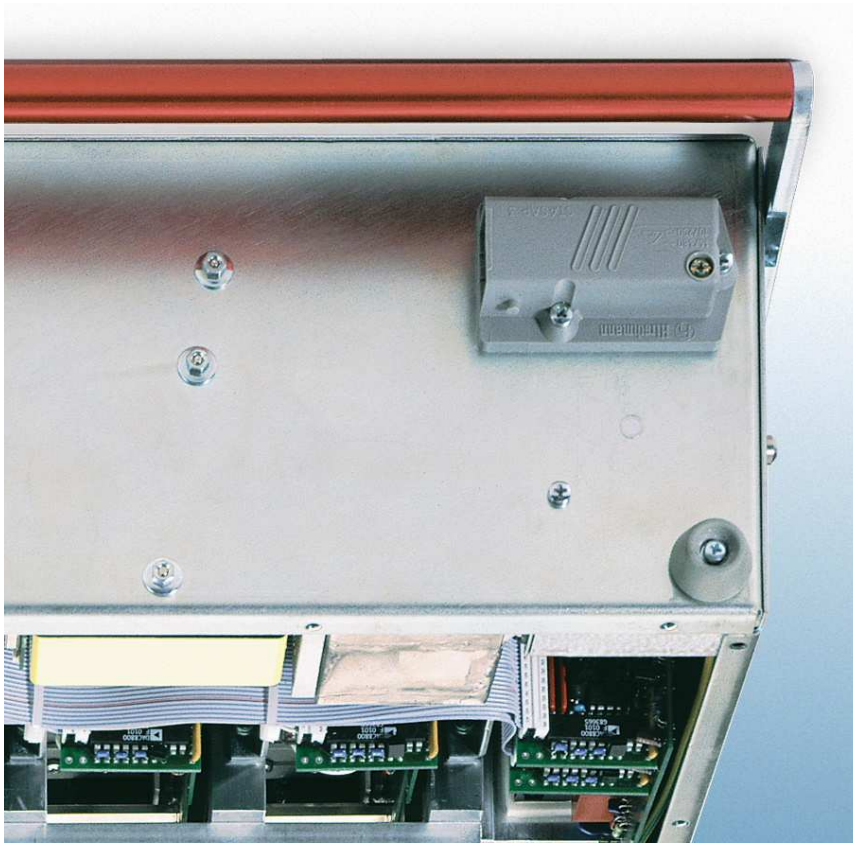
Cross talk: 300mV max.



(Vero)

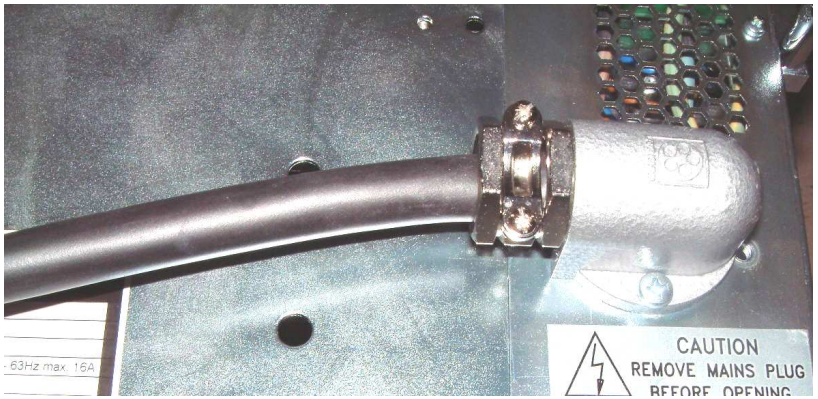
Modular Floating Power Supply

- 8 independent potential free outputs, floating
- Sensing of all outputs
- DC output power 3kW at 230VAC per 3U box (depends on installed modules)
- AC single phase, approved 16A connector



Modular Floating Power Supply

- Sinusoidal mains current EN 61000-3-2, 16A max.+15% peak reserve
- **Fixed power cord** for increased current to **18A input** continuously



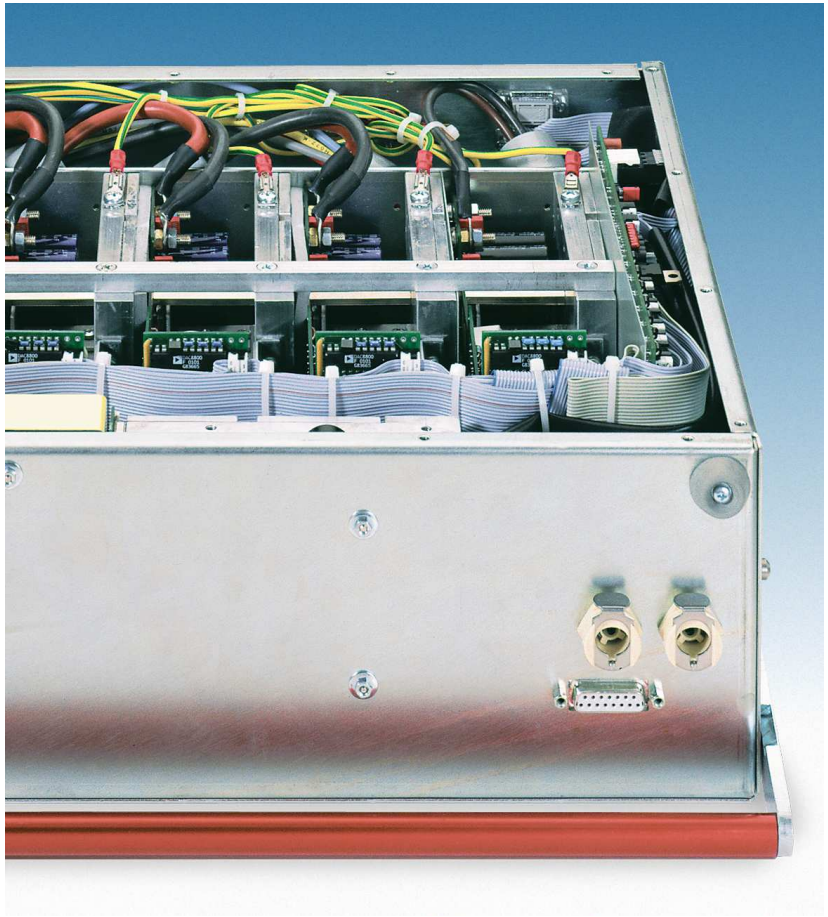
Power cord with strain relief

Modular Floating Power Supply

- AC or DC powered. 380VDC input offers 45% more output power
- Fully programmable trip off levels (also current limiting)
- Voltages ramp up 50ms, synchronic and monotone
- Voltage ramp down by fast output discharge (crow bar)
- Extremely low noise and low ripple **<20mVpp**

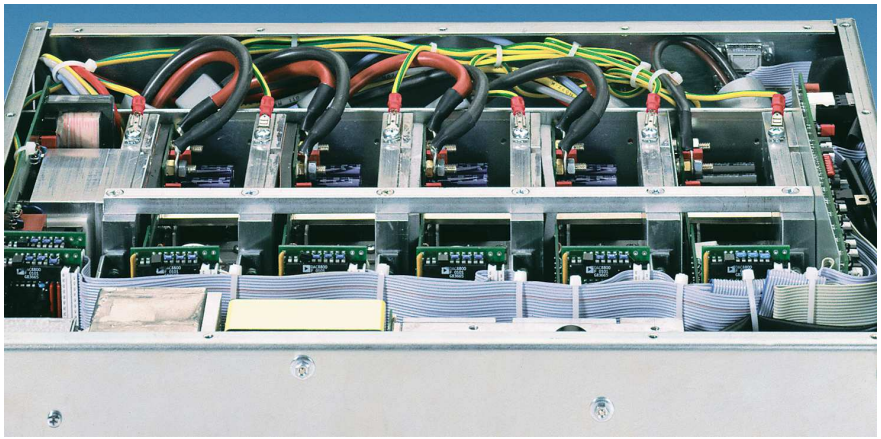
Modular Floating Power Supply

- CE conform EN 50 081/82 part 1
- Safety in accordance with EN 60 950
- Water cooled versions
- Easy insertion / extraction locking lever and carrying handle



Modular Floating Power Supply

- 9U Power box for 6 modules



- Floating Range >10V
  minimize DC- ground shift
  on backplane between
  separated voltage channels,
  even when the currents are strongly different

- Modules freely combinable for current increasing in parallel or as +/- outputs

Modular Floating Power Supply

Available modules:

Range	peak Output	nom Output	Type
2... 7V	115A / 550W	100A	Meh
4... 10V	85A / 650W	75A	Meh
+/- 7... 24V	12A / 2x240W	10A	Mdl
7... 16V	46A / 550W	40A	Meh
+/- 7... 14V	23,5A / 2x275W	20A	Mdh
30... 60V	13,5A / 650W	12A	Meh

Modular Floating Power Supply

Example for Standard Configurations:

9U Power Supplies (6 mod.)					6U Power Supplies (5 mod.)			
5V	3,3V	+/-12V	48V		5V	3,3V	+/-12V	48V
300A	100A	10A	12A		200A	100A	10A	12A
200A	100A	10A	24A		100A	200A	10A	12A
100A	100A	10A	36A		200A	200A	10A	-
200A	200A	10A	12A		100A	100A	10A	12A
100A	300A	10A	12A					
*	*	20A	*		*	*	20A	*

After sales revision of output performance at any time easily

Fan Tray

- different efficient DC blower operated Fan trays with pressure- and sucking- plenum 340, 400, 690mm, 160mm 3-fold ones without pressure plenum!
- alphanumerical Monitoring and trouble shooting display
- life insertion possible (to disable), limited operation time with extracted fan tray (programmable)
- manual programming of by use of switch algorithm possible

Fan Tray operations
switches & LEDs

- DC-On (Trip-off reset)
- Mode select (programming)
- Fan speed
- Auto off
- Remote address adj.
- Sys reset (protected)

- Power
- Fan speed
- Auto off
- Local

- Status
- Fan fail
- Overheat
- Sys fail

9U Fan Tray

- 9-fold standard fan tray for 400 mm modules and 220mm transition modules
- air baffle divides front and transition plenum
- 180m^3/h airflow per blower

Super Blower Fan Tray

- 4-fold super blower 400mm with plenum
- Alphanumeric LED display
- Also available with 6 super blower 690mm cools front and transition modules
- 380m^3/h airflow per blower

Monitoring & remote control

monitors:

- All voltages
  sense levels at backplane
- All currents
- Slot 1 temperature
- Fan turns
- Optional 7 further temp. sensors
- Trip-points (progr. mode)

- Failures diagnose:
  - over- under voltage (per channel)
  - over temperature
  - fan fail
  - internal failure (check sums, etc.)
  - AC-fail
  - monitor self-test

CANbus & OPC server

- Access to all monitoring information and control function
- Transfers turns of **ALL** fans in RPM
- Can handle up to 126 crates per node
- Address 127 may use for “emergency”
- Indicates each faulty card cage fan

Canbus Interface for Crate Remote Control

Wiener CANbus Interfaces can control and monitor

- Complete crates
- Power Supplies systems

  - voltages, currents, fans, temperatures, operation times, failure reports

Canbus Interface for Crate Remote Control

CANbus Controller

- Conforms CAN specification 2.0A (11-bits identifier)
- 9-pin male DSUB connector (CiA DS102-1 Specification)
- Opto-isolated transceiver , unshielded cable can be used with at least 110 nodes for high speed (1 Mbaud) bus

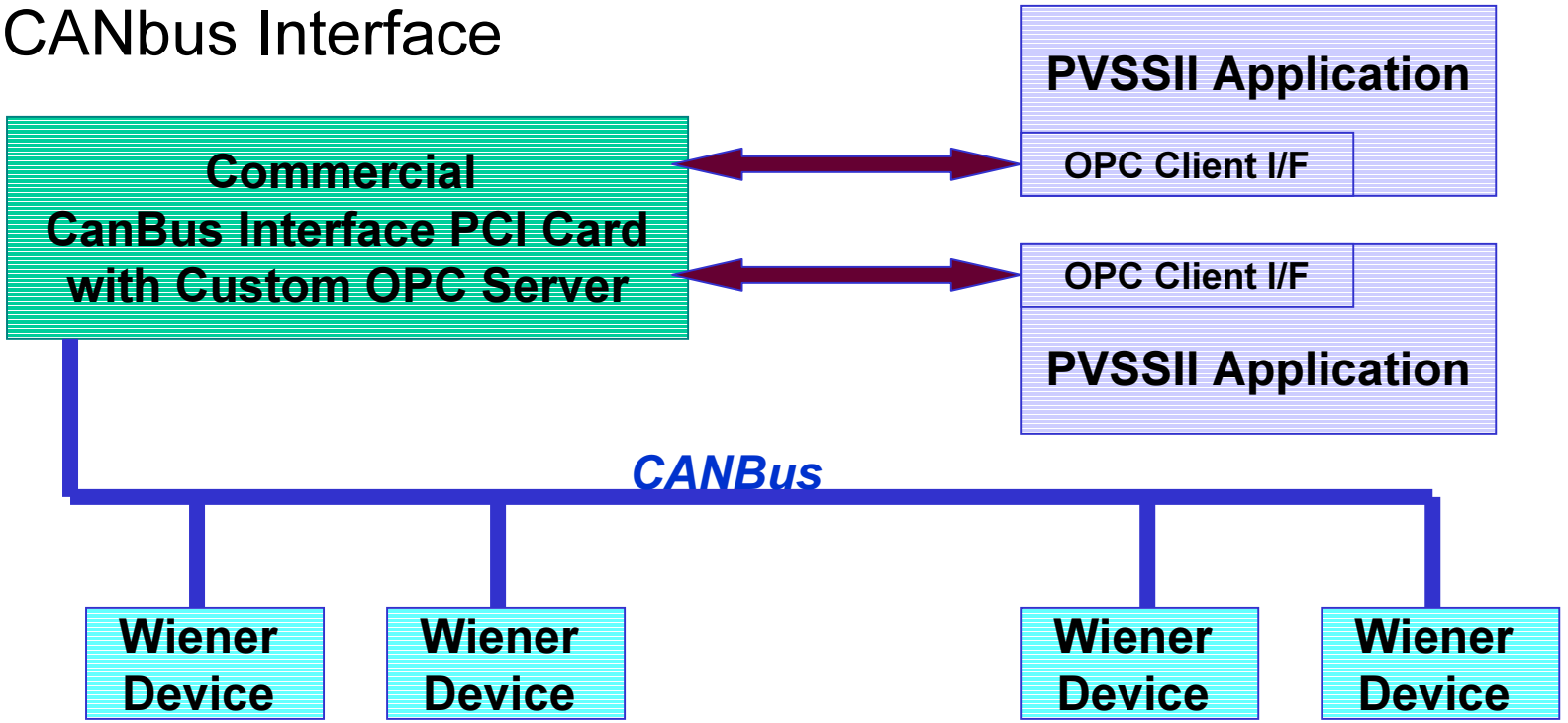
Canbus Interface for Crate Remote Control

Wiener CANbus Interface Protocol

- COB ID mapping doesn't directly correspond to the CAL/CMS priority definition
- CANOpen protocol is not supported
  - ➢No NMT, SDO, SYNC, TimeStamp, Nodeguard messages
  - ➢It doesn't conform Minimal Functionality Device Specification (CiA 301 profile)

CANbus Integration, Interface to SCADA

- via OPC standard
- CANbus Interface



Known devices only

Custom OPC Server

- **Features:**

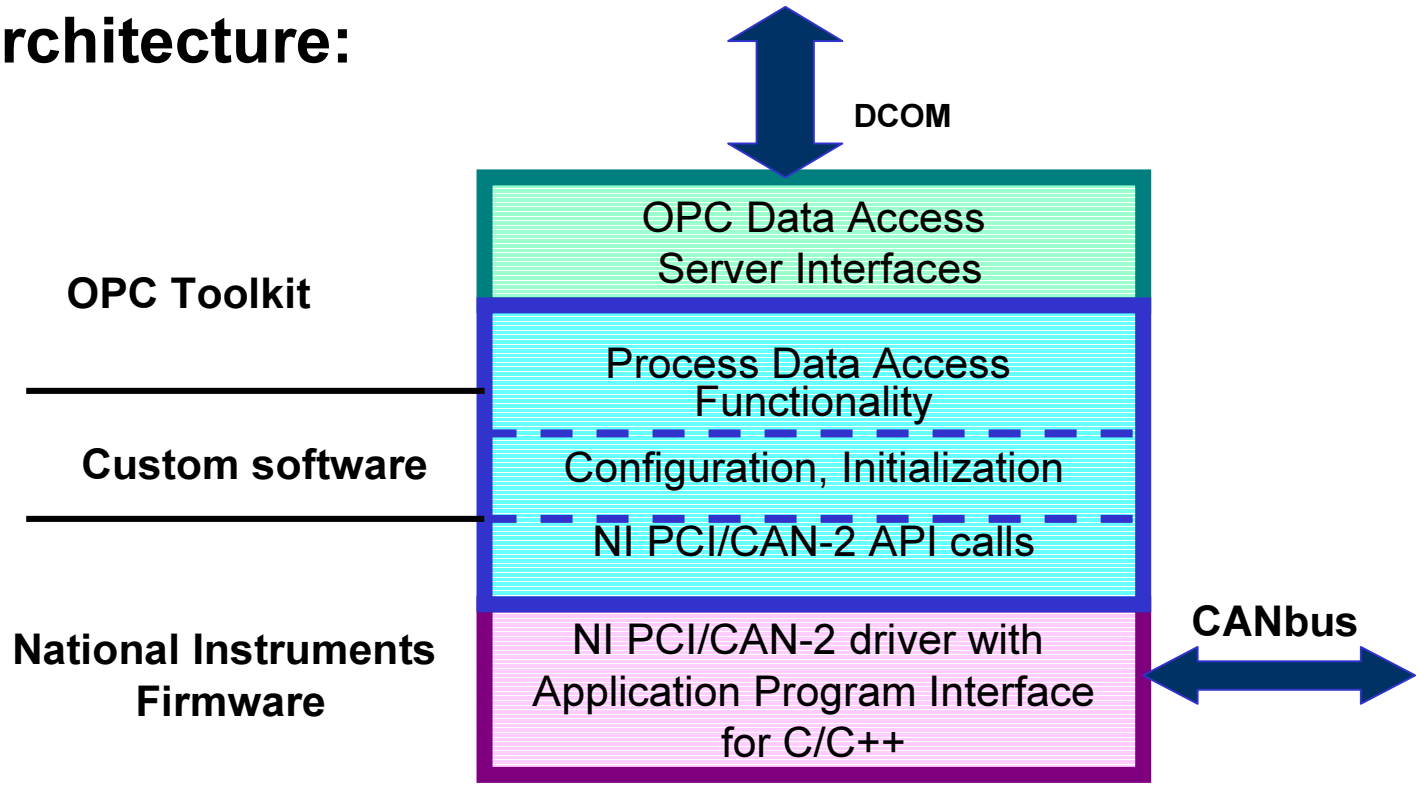
✓ Supports only one type of devices (i.E. WIENER only)

✓ Is dedicated to one type of PCI CAN I/F card (API library) – presently **National Instruments**

✓ Needs to be redesigned if one of above changes

Custom OPC Server

- **Architecture:**



Functional Blocks of the OPC Server Kit

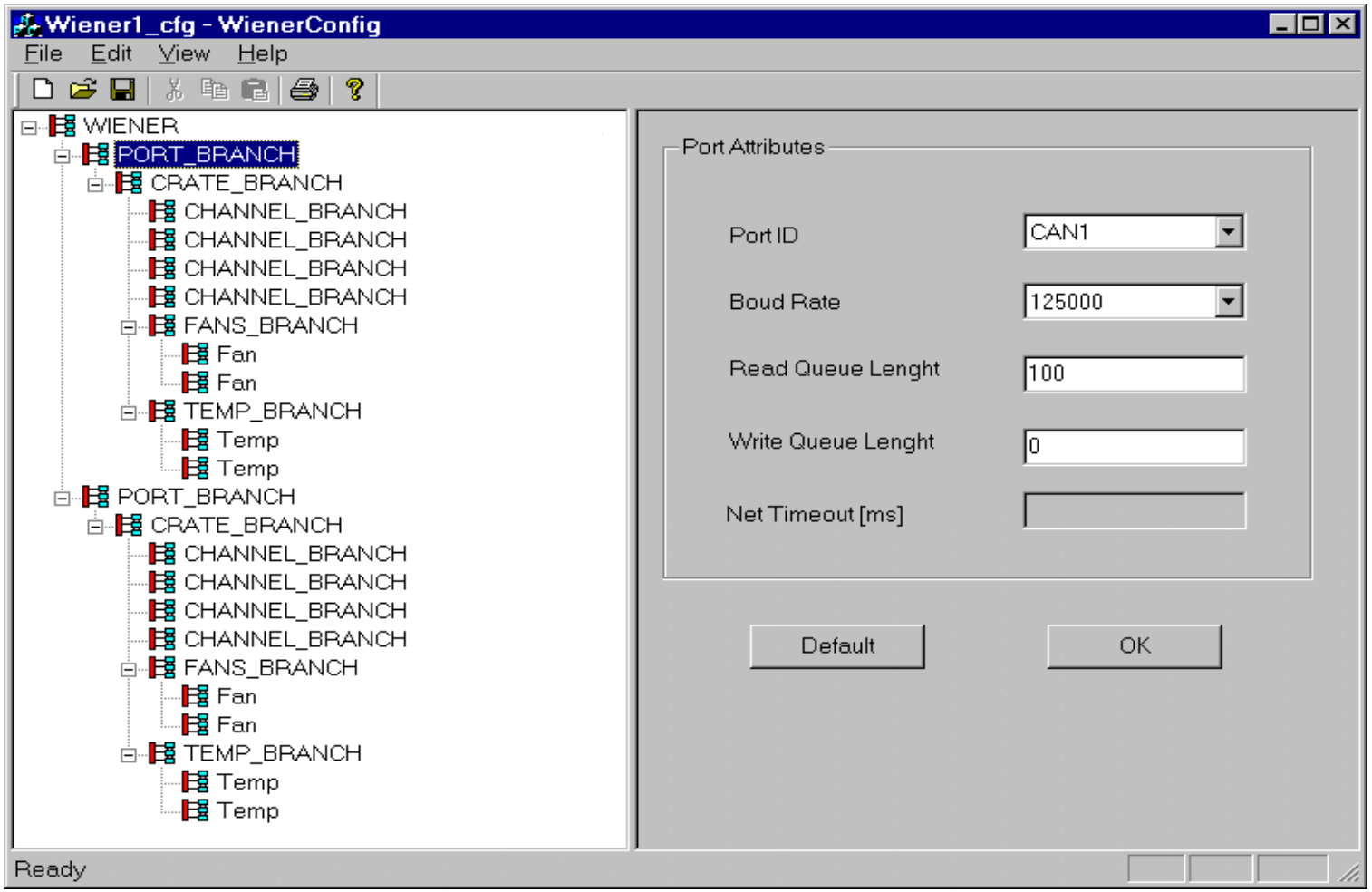
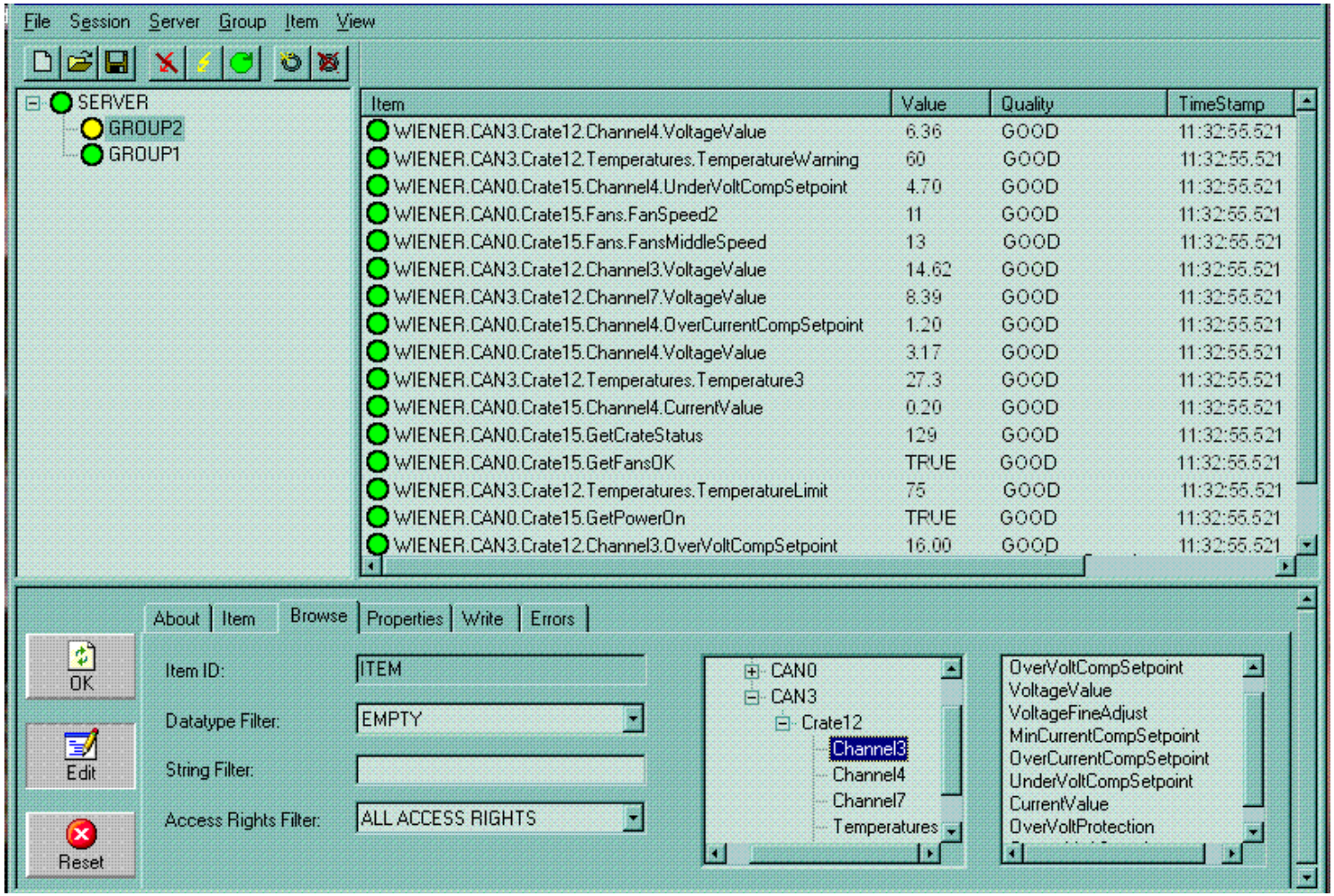
- CAN network configuration (see example)
  - External stand-alone tool/application
  - Graphical creation of configuration files (XML)
- Creator of process data namespace
- Names, attributes, tree structure
  - Variable space dependent on network and devices architecture
  - Permanent space with fixed items

Functional Blocks of the OPC Server Kit

- Initializer of the driver and devices
- Process data access queues handling
- Two separate threads: listening and transmitting (for each CAN port)
- Process data to/from CAN messages mapping
- ERROR (and WARNING) messages logger

Network configuration example

(variable namespace)



Client view example