



EPICS driver development of HBM MGCPPlus DAQ

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The hardware setup (1/2)



MGCplus

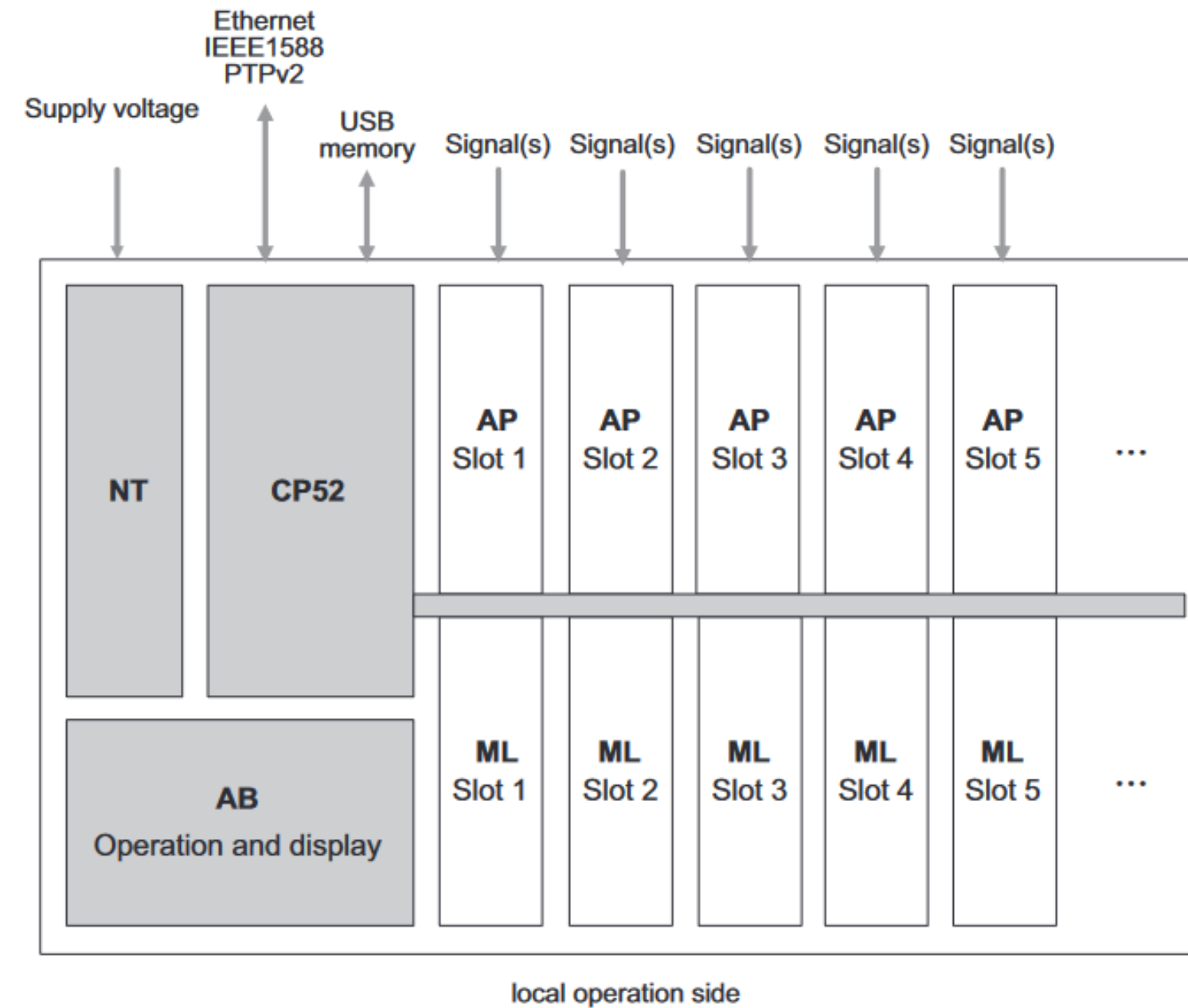
Measuring amplifier system

Special features

- Up to 128 channels per MGCplus enclosure (256 or 512 with CANHEAD or CAN)
- Sampling rates up to 19.2 kS/s per channel
- Simultaneous and parallel measurement with three independent sampling rates
- Stand-alone data logging with USB mass storage device
- Accuracy class to 0.0025
- Carrier frequency measuring amplifier for ambient conditions susceptible to error

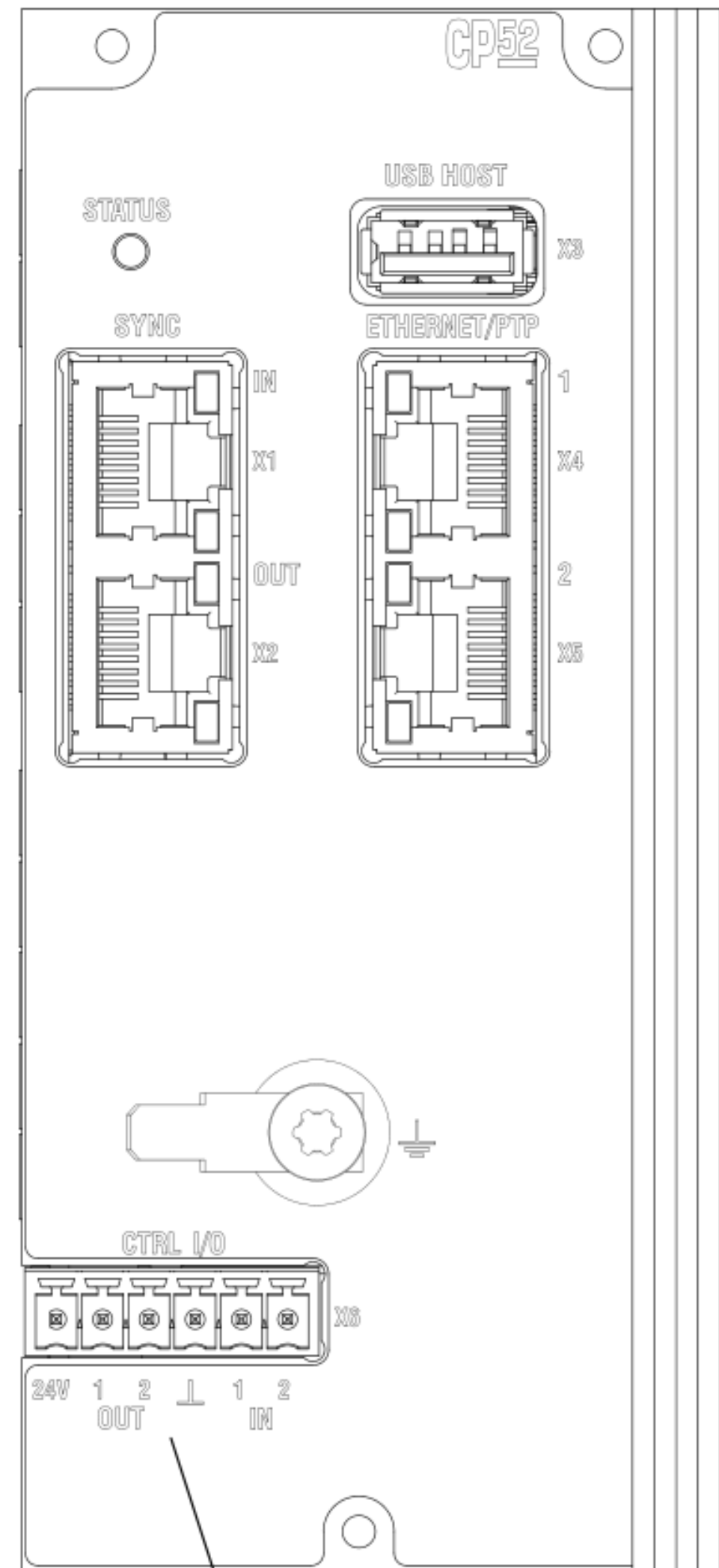
Data sheet

The hardware setup (2/2)



About the interface

- Ethernet interface
- USB Host
- USB Device (USB to RS232 converter)
- RS232, RS485/422
- Also supports PTP time synchronization





Commands to the device

- The device supports ASCII interface to configure it
- We used the programmers manual and the HBM Assistant program in order to understand all commands and the order they shall be sent out
- The device supports two ways of acquiring the data from the device
 - Via request – response
 - Via autonomous data publishing from the device (over UDP)
- Configuration of the device
 - Part of the configuration is for the whole device
 - Part of the configuration is specific for each channel
 - Part of the configuration is specific for each subchannel

Data received from the device

- Sending ASCII commands and queries is simple using the StreamDevice
- Parsing the measurement data from the device is a bit more complicated
 - We do the message parsing using the asyn port driver
 - Packet consists out of subchannel data from first channel to the last channel
 - If there is a card missing, this is not visible through the received data
 - At the end there is also the timestamp

4.103 MBF - Measuring Buffer Format

This command establishes the RMB and output format. The format applies both to direct output over an interface and redirected output to a file or stream.

The query command returns the currently set format.

MBF p1,p2(x) -> q1(y)	
<hr/>	
p1	mode
	1253: 4 bytes binary (Int32) little endian (raw value) (default)
	1252: 4 bytes binary (Int32) big endian (raw value)
	1257: 4 bytes binary (Float) little endian (physical size)
	1256: 4 bytes binary (Float) big endian (physical size)
	1255: 2 bytes binary (Int16) little endian (raw value) (deprecated)
	1254: 2 bytes binary (Int16) big endian (raw value) (deprecated)
p2	measurement rate group 0,...,2
q1	0: command successfully executed
	?: error

If parameter *p2* is omitted, the setting affects all measurement rate groups.

4.103.1 Raw formats

Raw value formats are to be scaled using the following rules:

32 Bit Integer Formats

$$ScaledValue = \frac{24BitRawValue}{7680000.0} \cdot ScalingFactor - ScalingOffset$$

Little Endian raw formats carry the measured value status in the 1st byte. Big Endian raw formats carry the measured value status in the 4th byte. The measured value has the following bits:

- 0x10: gross overflow
- 0x20: net overflow
- 0x40: calibration error
- 0x80: change bit

How the received message looks like

ML30B

C0S0	C1S0	C2S0	C3S0	...	C14S0	C15S0	TIMESTAMP
------	------	------	------	-----	-------	-------	-----------

ML801B

C0S0	C0S1	...	C0S8	C2S0	C2S1	...	C14S0	C14S1	...	C14S8	TIMESTAMP
------	------	-----	------	------	------	-----	-------	-------	-----	-------	-----------

```
record (ai, "$(DEV)-CH$(CHAN)-S$(SUBCH):ENG") {  
  field(DESC, "Engineering value ch$(CHAN) s$(SUBCH)")  
  field(DTYP, "asynFloat64")  
  field(INP, "@asyn$(ASYN_COMM), $(INDEX)NET")  
  field(FLNK, "$(DEV)-CH$(CHAN)-S$(SUBCH):DECBUF")  
  field(TSE, "-2")  
  field(SCAN, "I/O Intr")  
  field(EGU, "UNIT")  
}
```

Device application at ITER

- Strain measurement
 - Using up to 16 ML30B cards, up to 16 subchannels at 2400 Hz
- Displacement measurement
 - Using up to 8 ML801B cards, up to 64 subchannels at 300 Hz
- Temperature measurement
 - Using up to 16 ML801B cards, up to 128 subchannels at 1 Hz

Thank you!

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