NÅNO™ 300 – Hardware

NÅNO™ 300 Flow Computer

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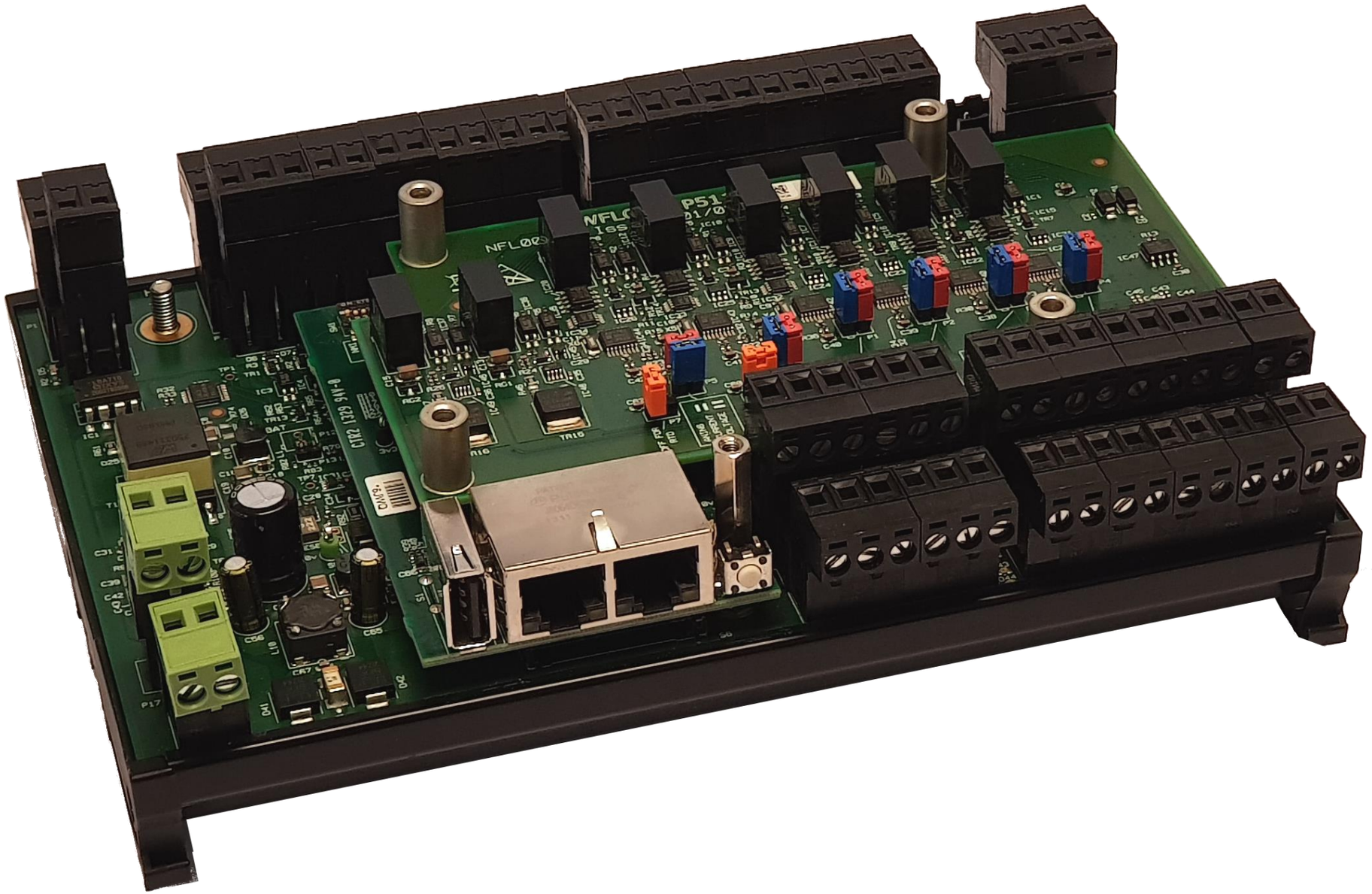


Newflow

NÅNO™ – Overall Design

- Comprises of Three boards - Main, CPU & Analog
- Sequencing of Information very important in the philosophy of our design.
- The design captures the input data and pre-processes it at the Main board. It is then passed to the CPU board for further processing on the NÅNO's Heartbeat
- Outputs are calculated in the CPU board, then passed to the Main board (again on the Heartbeat), processed and then passed to the physical I/O as raw data for output.
- High Accuracy
- High Repeatibility

Newflow

NÅNO™ – Overall Design

- As an Operating System we decided to use Linux as;
  - Royalty Free
  - We own the source code, therefore;
  - We can modify, if any problems are found.
  - We are not tied with restrictions such as;
    - Expensive maintenance contracts (Linux has a very high user base, giving availability of extensive support)
    - Being tied to Manufacturers release schedules of Proprietary Firmware.
    - Trying to chase Manufacturers releases to keep the units supportable.

Newflow

NÅNO™ – Overall Design

- Although the OS is multi tasking, we have implemented a C||Cure™ programming language and environment.
- In the NÅNO itself, it has;
  - a sequential, single threaded task
  - using a Hardware generated Heartbeat – with a ‘pulse’ every 0.5 seconds.
- We have taken the advantages of C,
- But then removed some of the disadvantages
  - pointer referencing
  - declared types

Newflow

NÅNO™ 300 – Field I/O

- All field I/O including the RS485 port are optically isolated to eliminate crosstalk and aid robustness
- Six high resolution Analog Inputs, two can be used as RTDs
- Four meter Pulse Inputs support Level A, B or E and can be used for period measurement with nanosecond resolution
- Nine Digital Inputs and Eight Digital Outputs, two of the outputs can be used as Pulse Outputs
- Two Analog Outputs
- Alarm “relay” with NO and NC contacts

NÅNO™ 300

- How Does It All Plug Together??

NÅNO™ – Overview

- The Nano comprises of 3 Component Parts;
  - Main Board (P513)
  - CPU Board (P514)
  - Analog Board (P511)

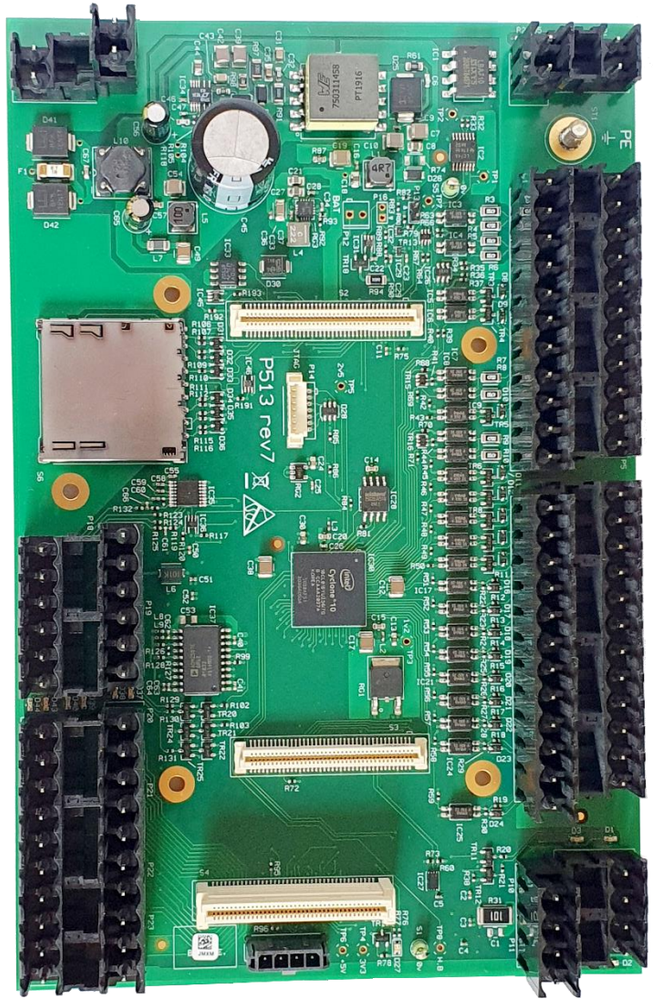
Main Board (P513)

- This uses an NIOS II FPGA (Field-Programmable Gate Array).
- Current builds use an Intel Cyclone 10 device however other manufacturers can be used.
- Split into 2 areas;
  - Hardware interface
  - Soft Core NIOS 2 CPU running at 75 MHz

Newflow

Main Board (P513)

- Contains the Power Supply
- I/O Processor
- Protection Circuitry
- I/O Connection Terminals
- Expansion Connector



Newflow

Field Connectivity – Connectors

Input Power
12-24VDC
4W Typical

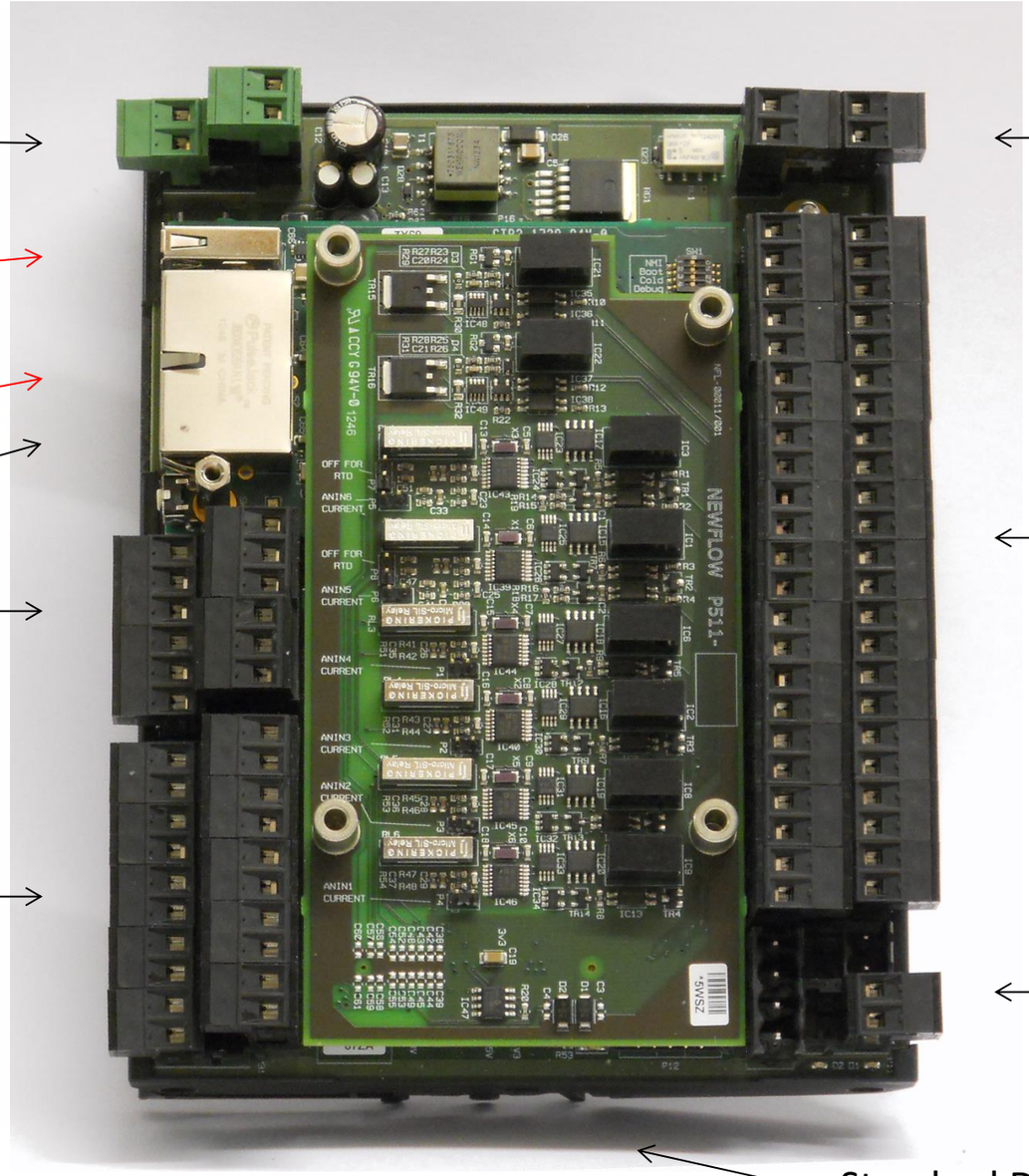
USB
Expansion

Dual
Ethernet

SD Card Slot

Serial
Comms Ports

Analog I/O



N/O and N/C
Watchdog
Contacts

Digital I/O
including
Pulse Count
& Period

Further
Expansion
terminals

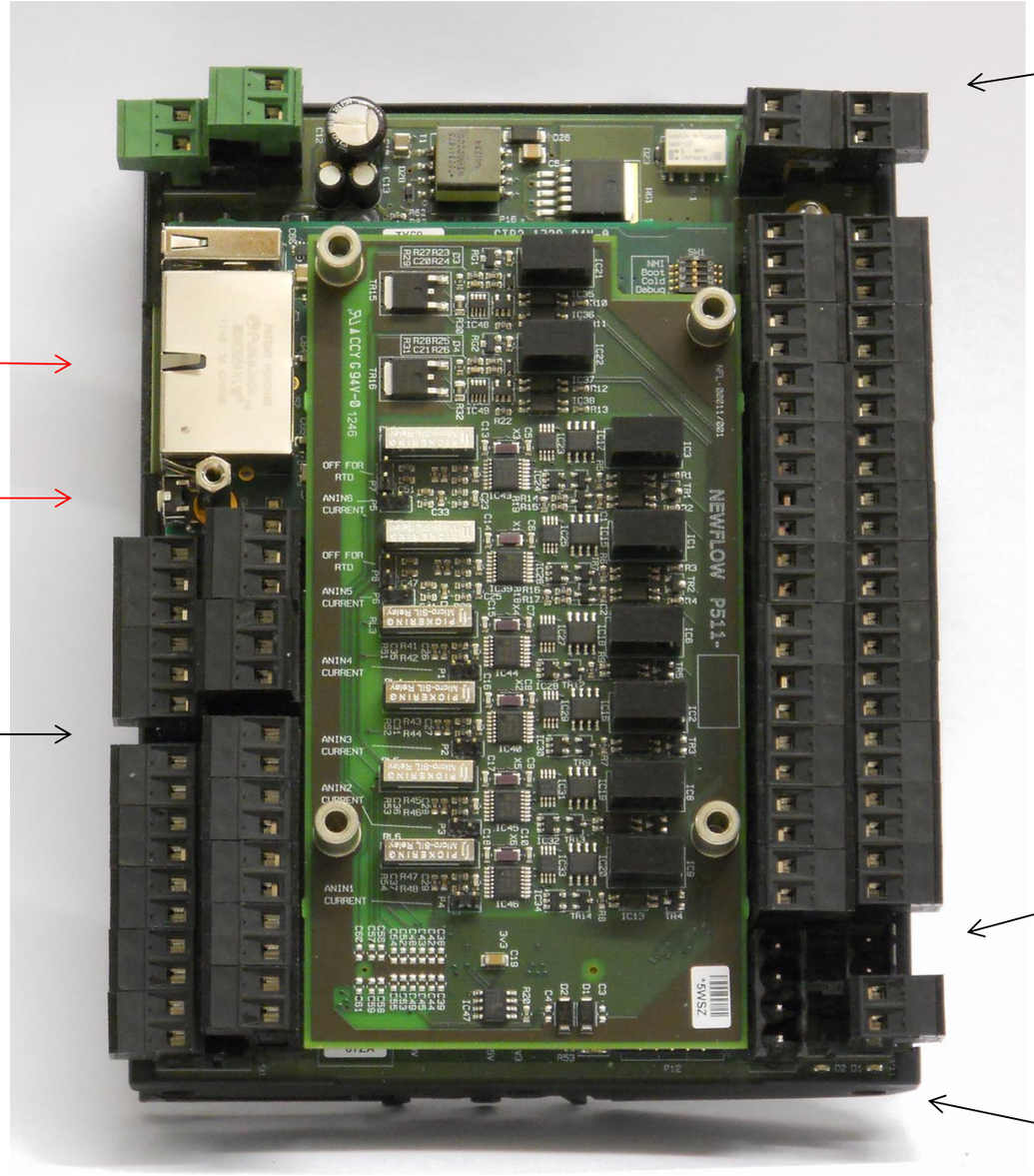
Standard DIN Rail Mounting

Field Connectivity - LEDs

Ethernet Connectors with LED Diagnostics

Status / Ident LEDs

Serial Comms Activity LEDs (COM1-3)

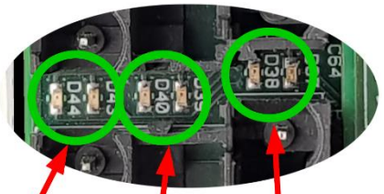


Power LED

Serial Comms Activity LEDs (COM4)

Inter Board Comms LEDs

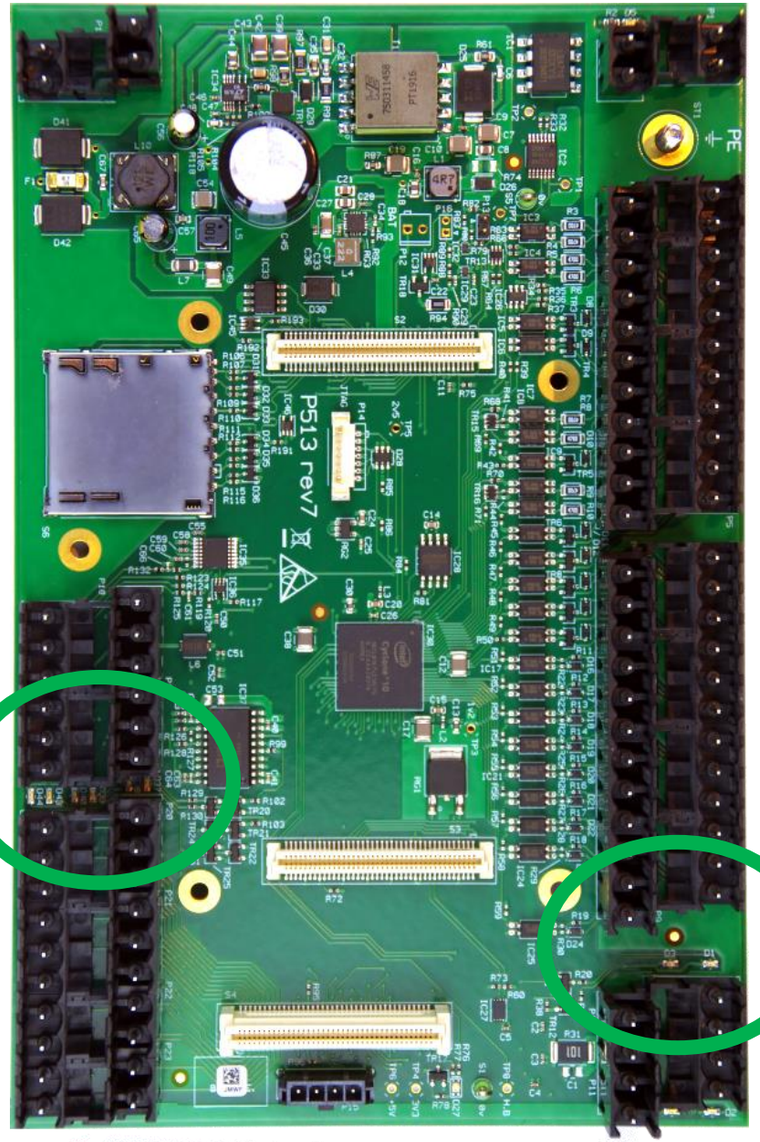
Field Connectivity - LEDs

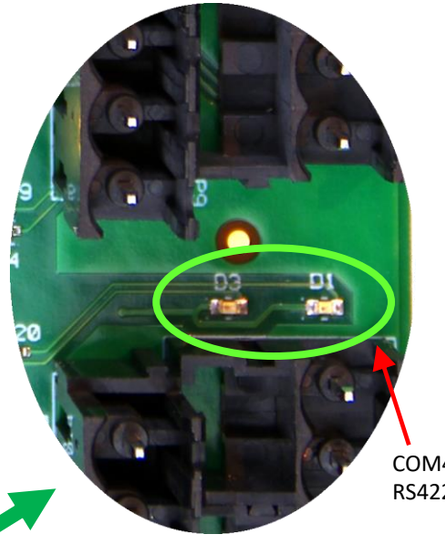


COM1
RS232

COM3
RS422/485

COM2
RS485





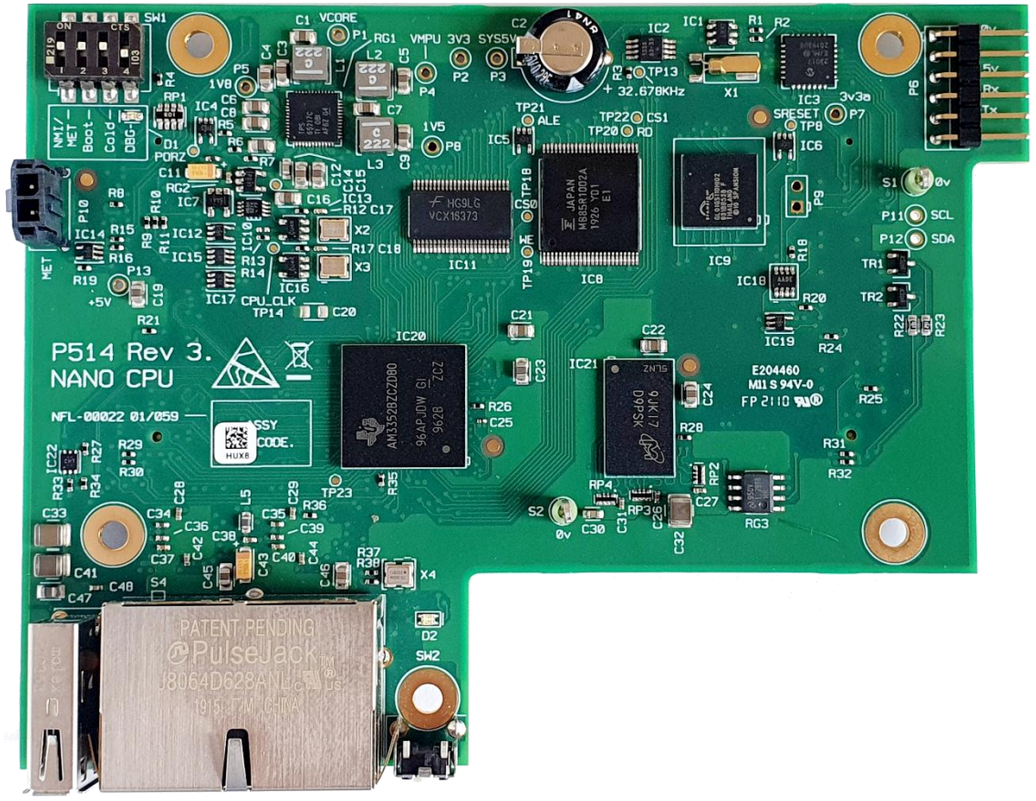
COM4
RS422/485

Newflow

Main Board (P513) – I/O

- Gives the following I/O Capabilities;
  - 9 x Digital Inputs
  - 8 x Digital Outputs, 2 of which can be allocated as Pulse Outputs
  - 4 Pulse Inputs, can be used as;
    - Pulse Trains A & B – Either Single Pulse Trains or a Dual Pulse Train
    - Pulse Trains C & D – Both can be either Single Pulse Trains, Period (Density) Inputs or a mixture.
  - 1 x Raw Pulse Input/Output

CPU Board (P514)



Newflow

CPU Board (P514)

- TI Sitara Cortex-A8
- 1GHz AM3352 used
- Working DRAM, 256MBytes DDR3
- NOR Flash, 128MBytes
- Ferroelectric RAM, up to 512KBytes
- Battery Backed SRAM, None ⇒ NO BATTERIES!
- Dual, Independent 10/100MHz Ethernet NICs
- Four Serial Ports: 1 x RS232, 1 x RS485, 2 x RS422/485
- Highly stable master clock source

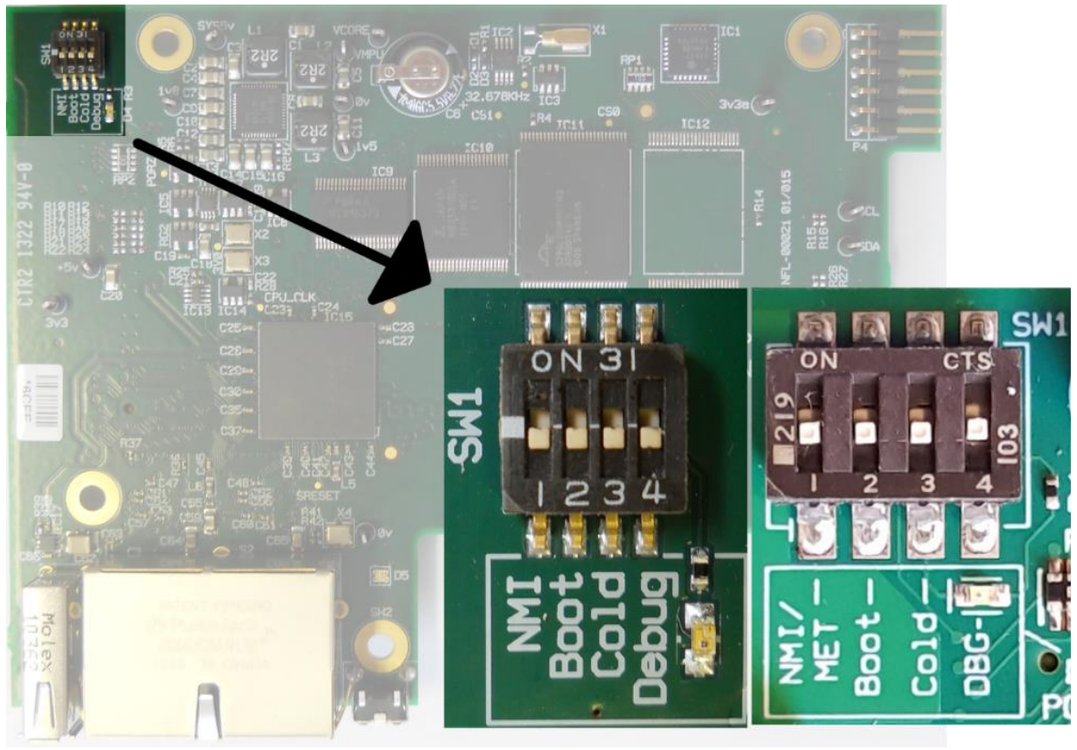
Newflow

CPU Board (P514)

- Connector to allow an external Metrology switch
- DIP Switch to secure the application
  - SW1-1 – NMI/MET – Security Link (to lock out Metrology Level logins)
  - SW1-2 – Boot – Reserved for future expansion
  - SW1-3 – Cold – Used to clear down the application and memory in the NÅNO
  - SW1-4 – Debug/DBG – To be used under factory instruction only

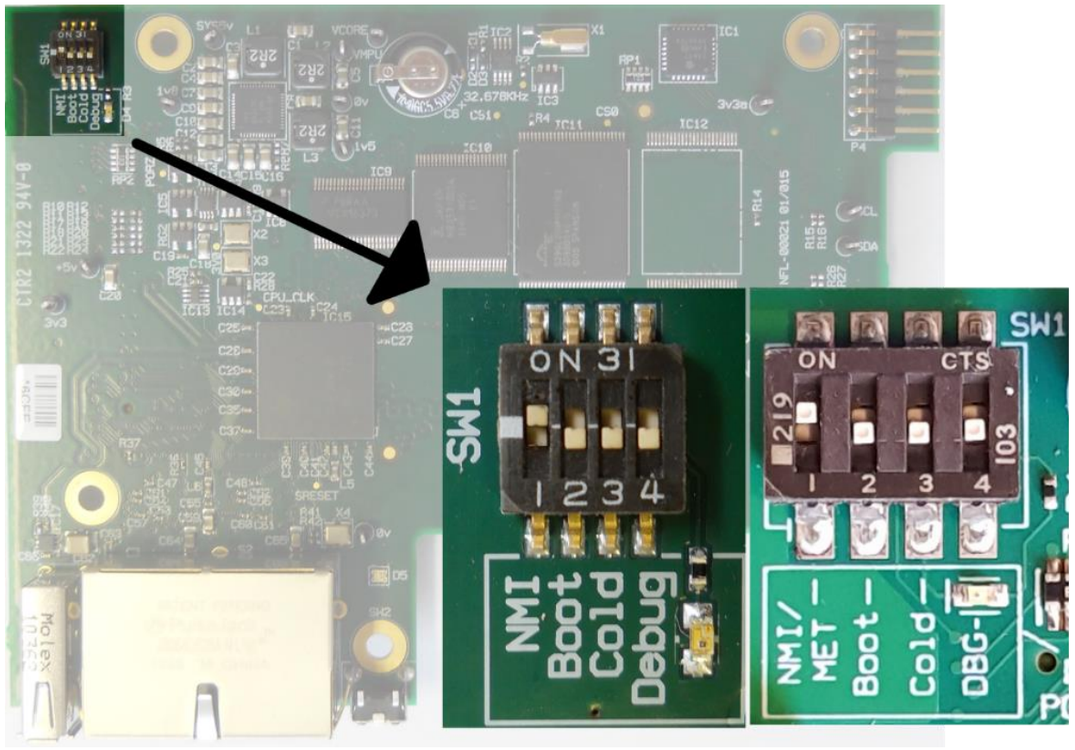
CPU Board (P514)

- Protected so Metrology data can not be changed

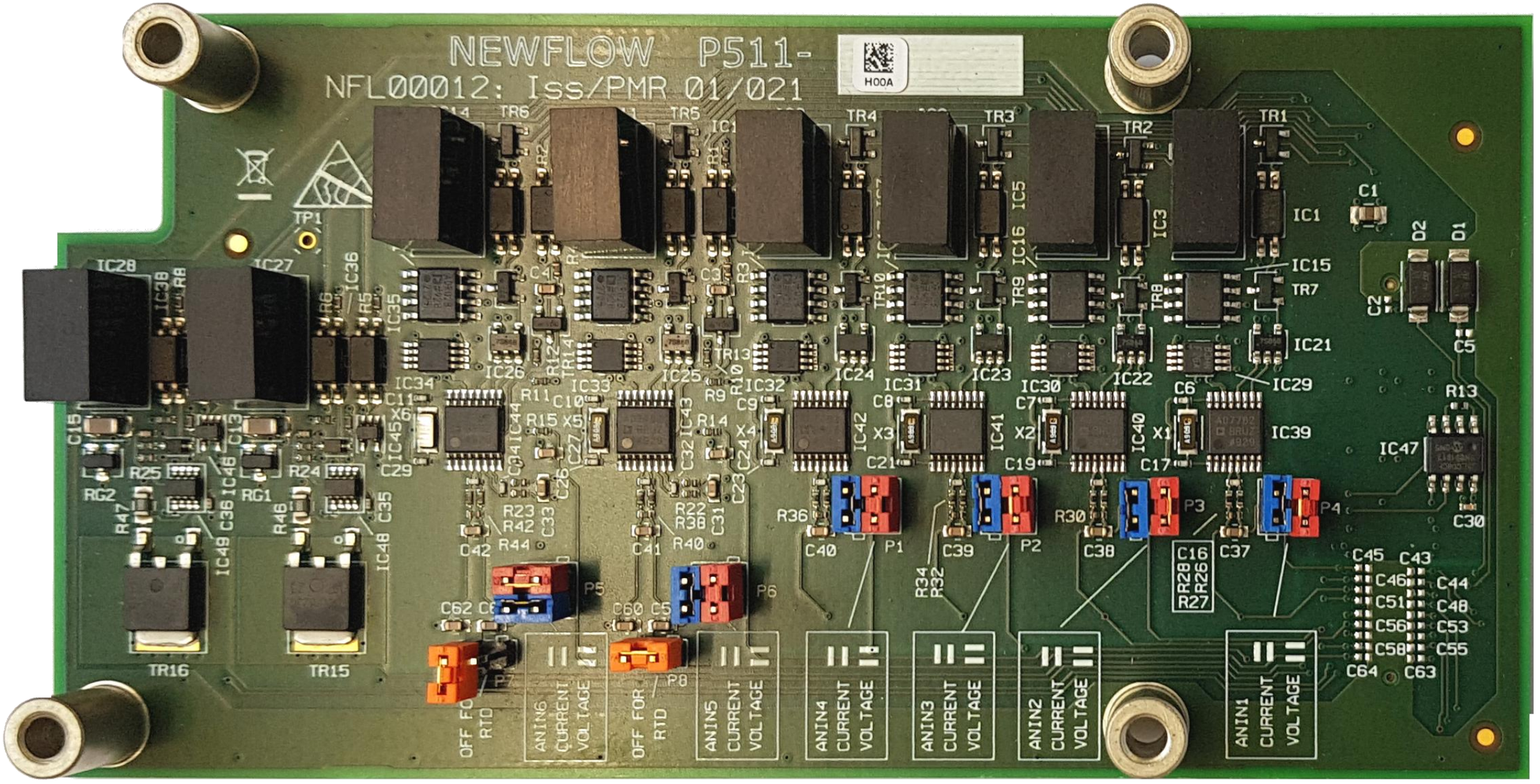


CPU Board (P514)

- Un-Protected, Metrology data can be changed



Analog Board (P511)

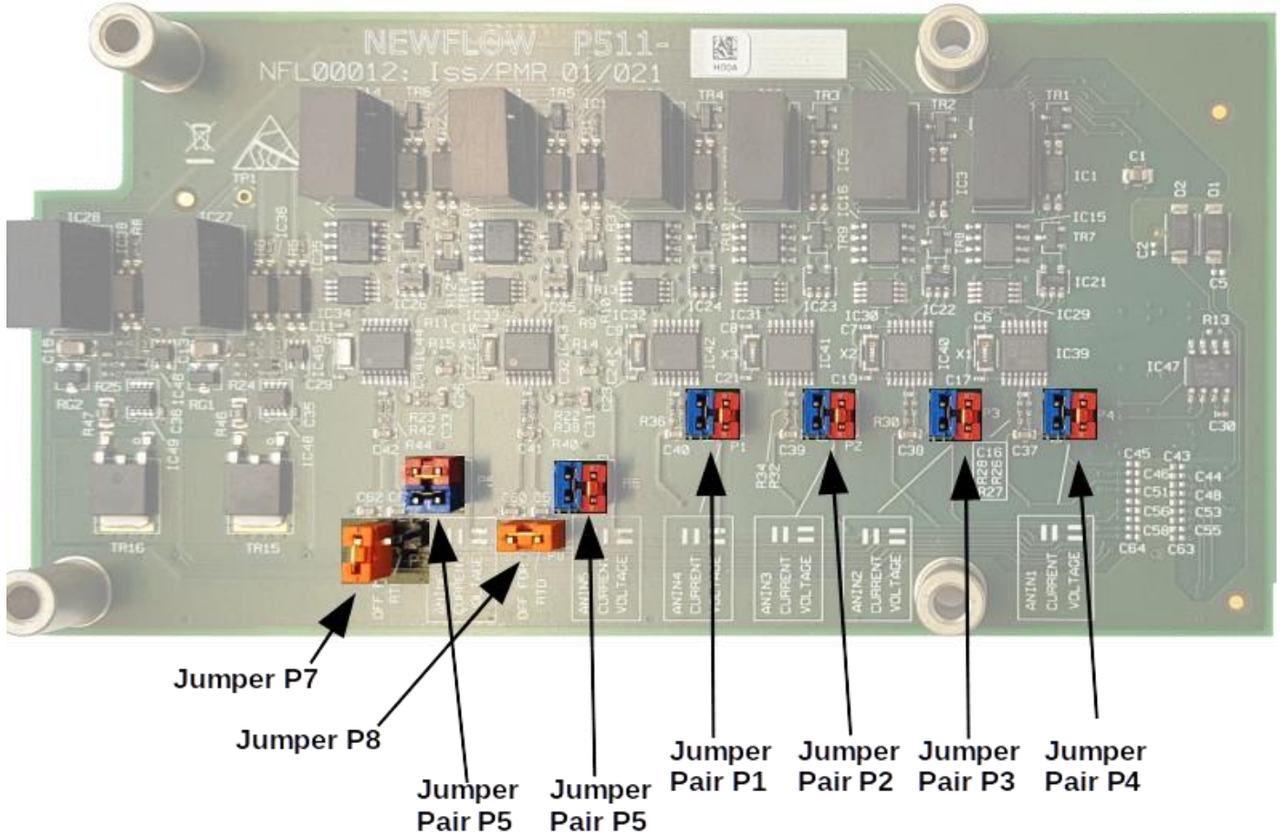


Analog Board (P511)

Plugs onto the Expansion Connector and gives the following I/O Capabilities;

- 4 x Dedicated 4-20mA / 1-5V Inputs
- 2 x Selectable 4-20mA / 1-5V / RTD / 4 wire PT100 Input
- 2 x 4-20mA Outputs

Analog Board (P511)



- Now time for Visual C||Cure….

Visual CllCure® Demo