

**Warsaw University
of Technology**



**Faculty
of Mechatronics**

WARSAW UNIVERSITY OF TECHNOLOGY

Cable Tester design for NICA-MPD Platform

Author: Grzegorz Nakielny
Supervisor: Marek Peryt



Contents



Overview



Software



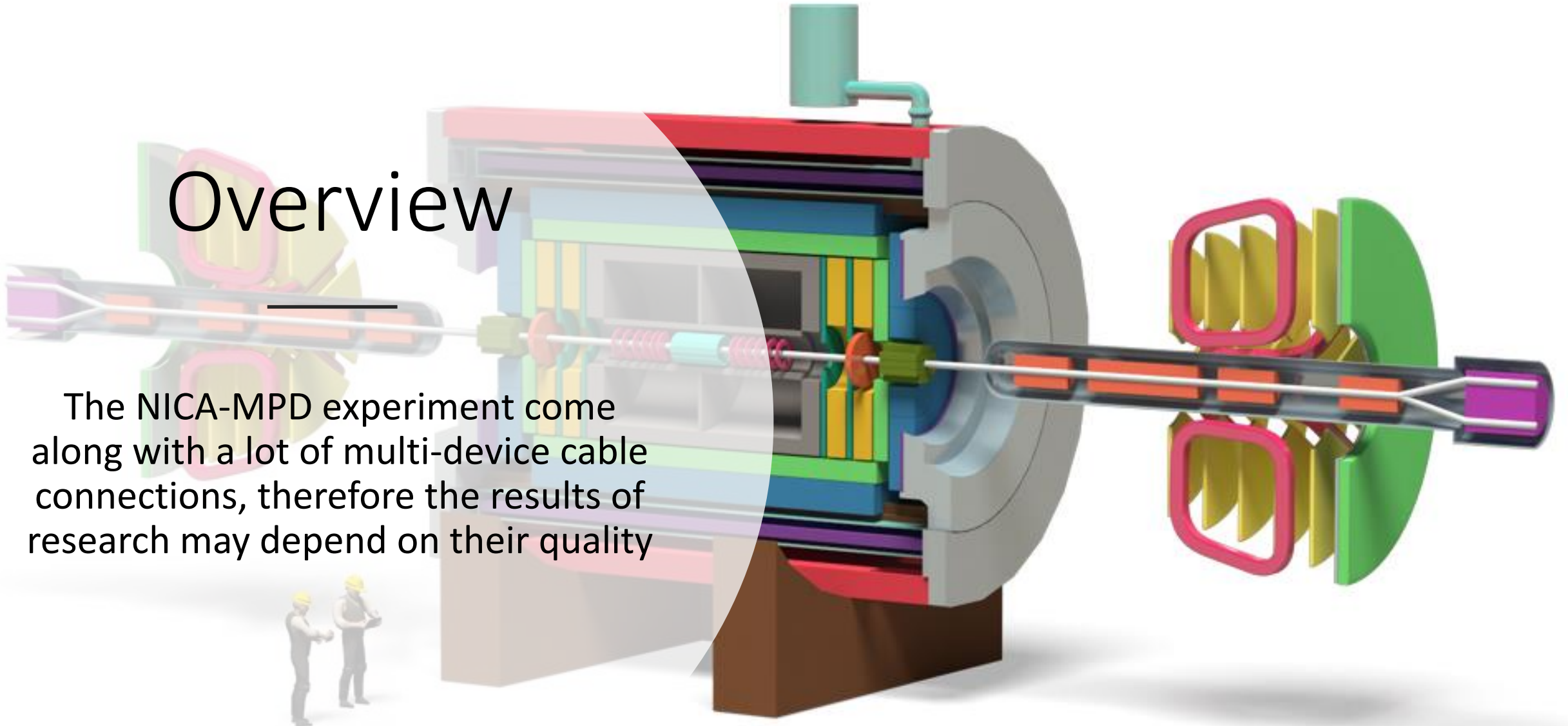
Electronics



Mechanics & Assembly

Overview

The NICA-MPD experiment come along with a lot of multi-device cable connections, therefore the results of research may depend on their quality



Cable Tester - Requirements

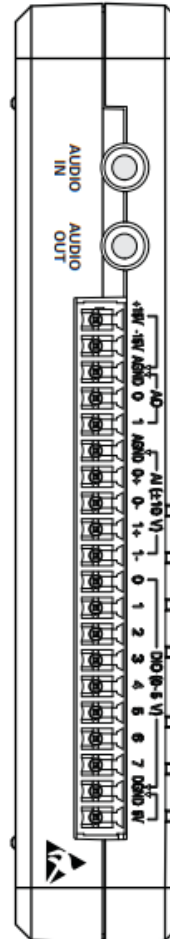
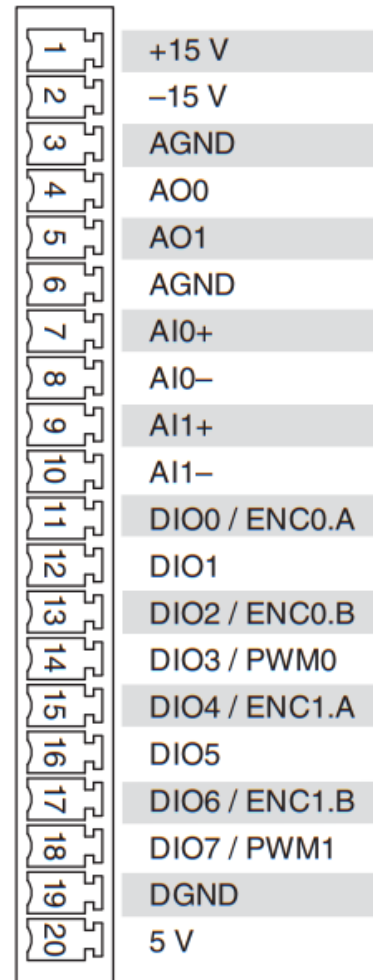
- Conducting tests on most popular signal cables
- Software made using LabVIEW
- User interface for reviewing and managing test results
- May be implemented in standard RACK cabinet



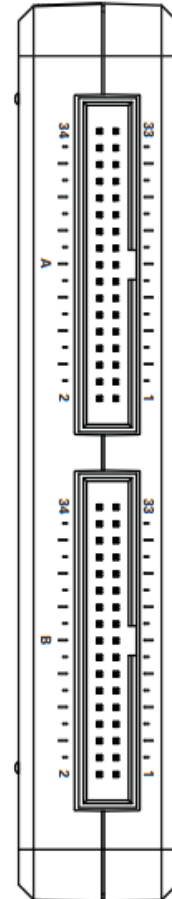


Software

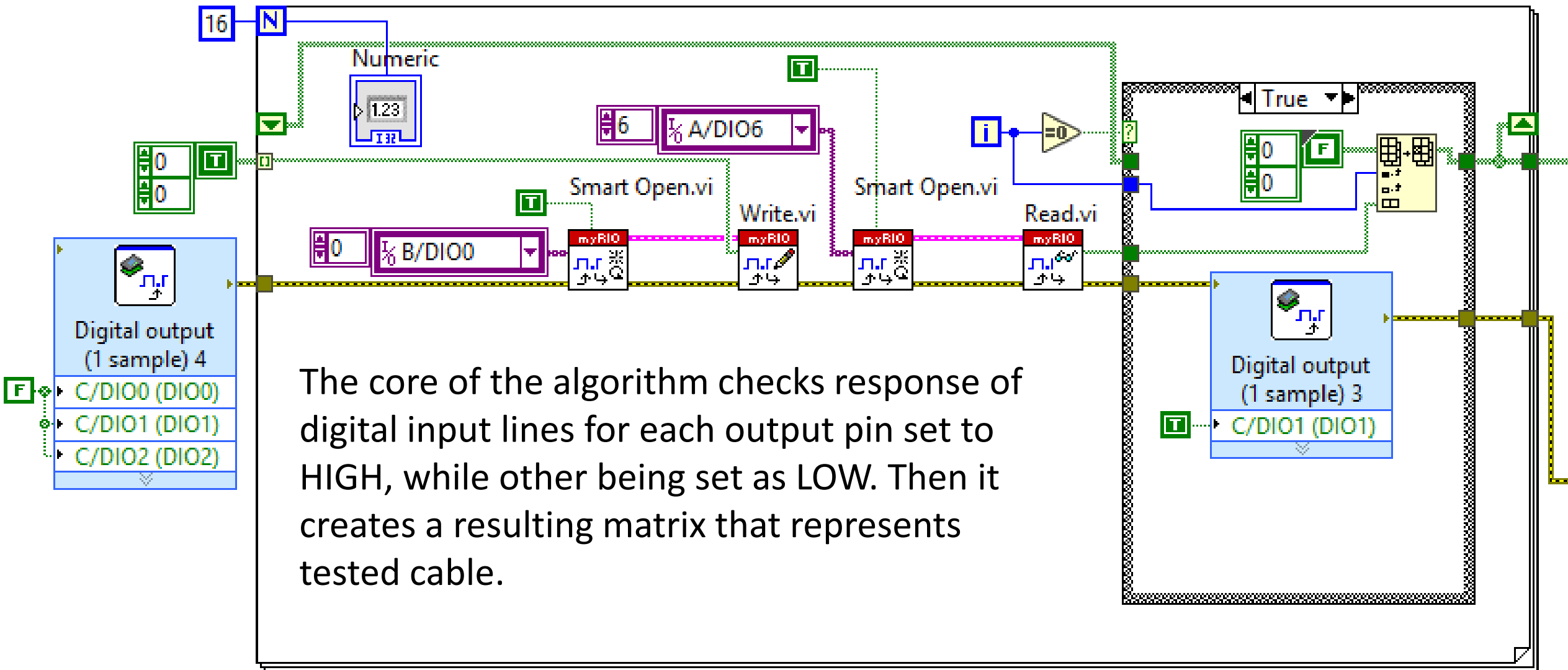
myRIO



DIO15 / I2C.SDA	34	33	+3.3 V
DIO14 / I2C.SCL	32	31	DIO10 / PWM2
DGND	30	29	DIO9 / PWM1
DGND	28	27	DIO8 / PWM0
DIO13	26	25	DIO7 / SPI.MOSI
DGND	24	23	DIO6 / SPI.MISO
DIO12 / ENC.B	22	21	DIO5 / SPI.CLK
DGND	20	19	DIO4
DIO11 / ENC.A	18	17	DIO3
DGND	16	15	DIO2
UART.TX	14	13	DIO1
DGND	12	11	DIO0
UART.RX	10	9	AI3
DGND	8	7	AI2
AGND	6	5	AI1
AO1	4	3	AI0
AO0	2	1	+5V

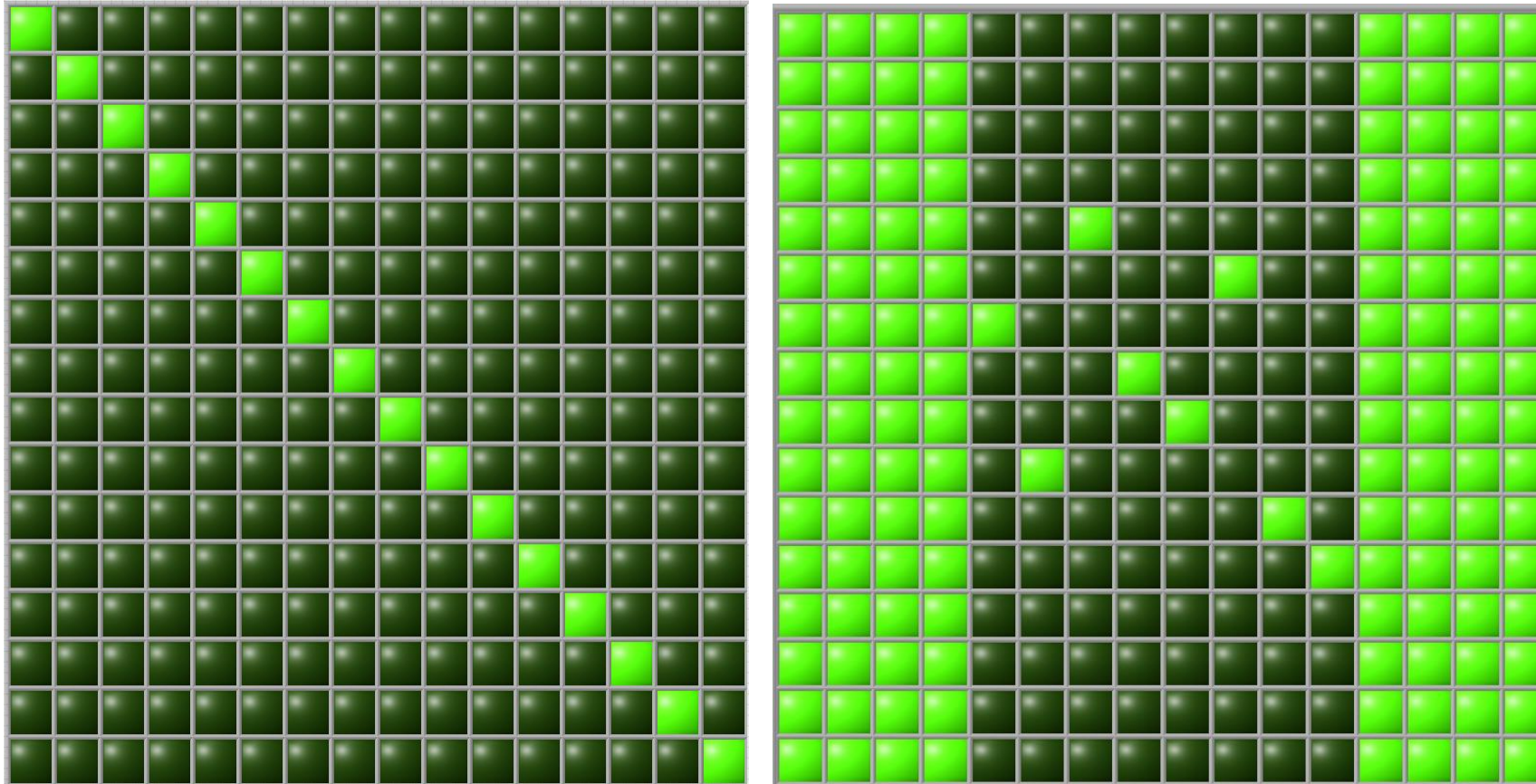


NI myRIO board comes with 40 digital programmable input/output lines which will be used for the testing purposes



LabVIEW – testing algorithm

Connection Matrix



- Output of cable test
- Visual representation of connections
- Unique representation for each type of cable

User interface



EXECUTION OF
TESTS



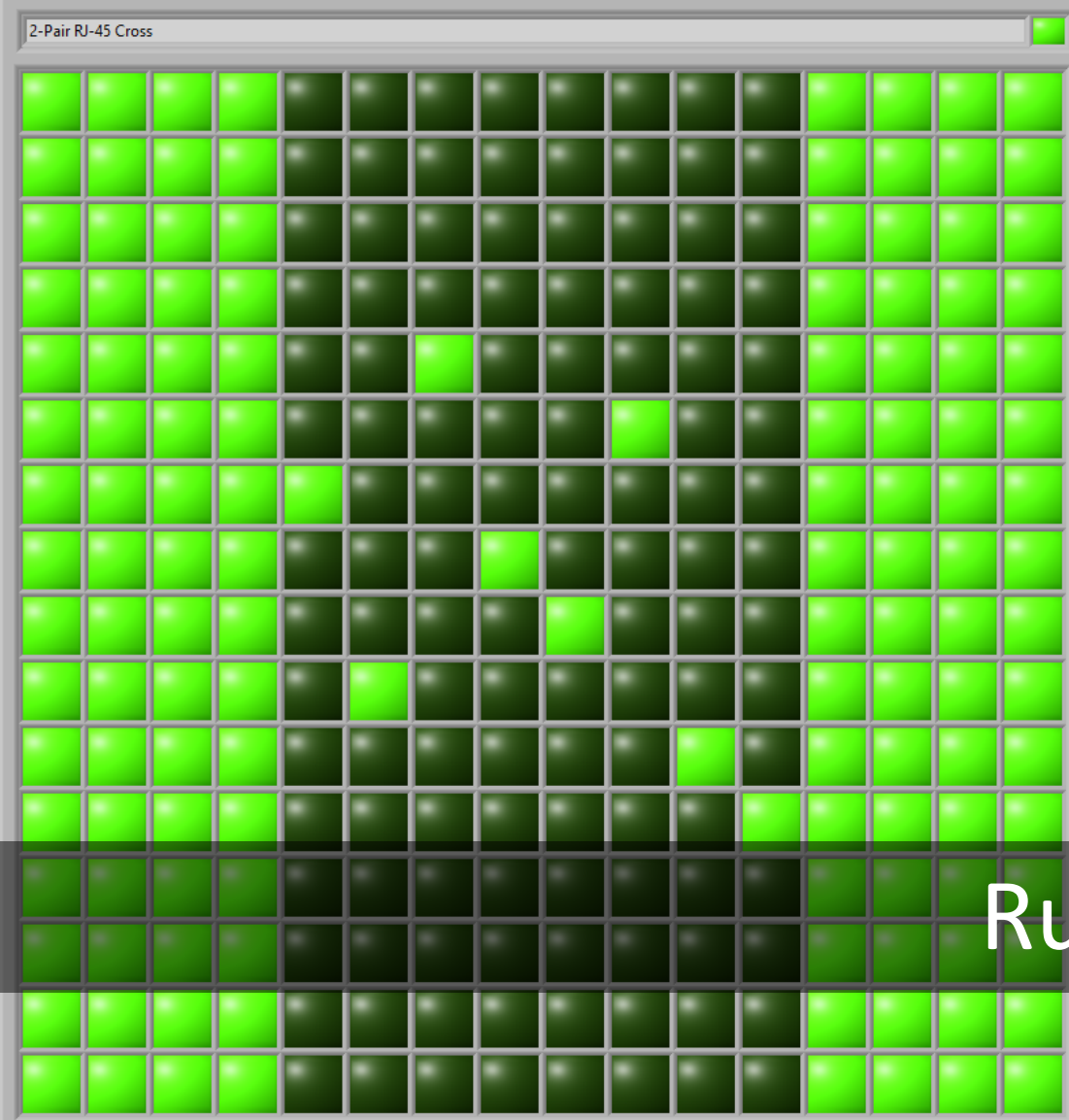
INDICATION OF
RESULTS



MANAGEMENT OF
CORRECT PATTERNS



ERROR INDICATION



◀ Indicates detected correct pattern

NICA-MPD Platform Cable Tester 1.0

Press "Start Test" button or myRIO physical button0 to conduct a cable test

"STOP" - Abort VI execution

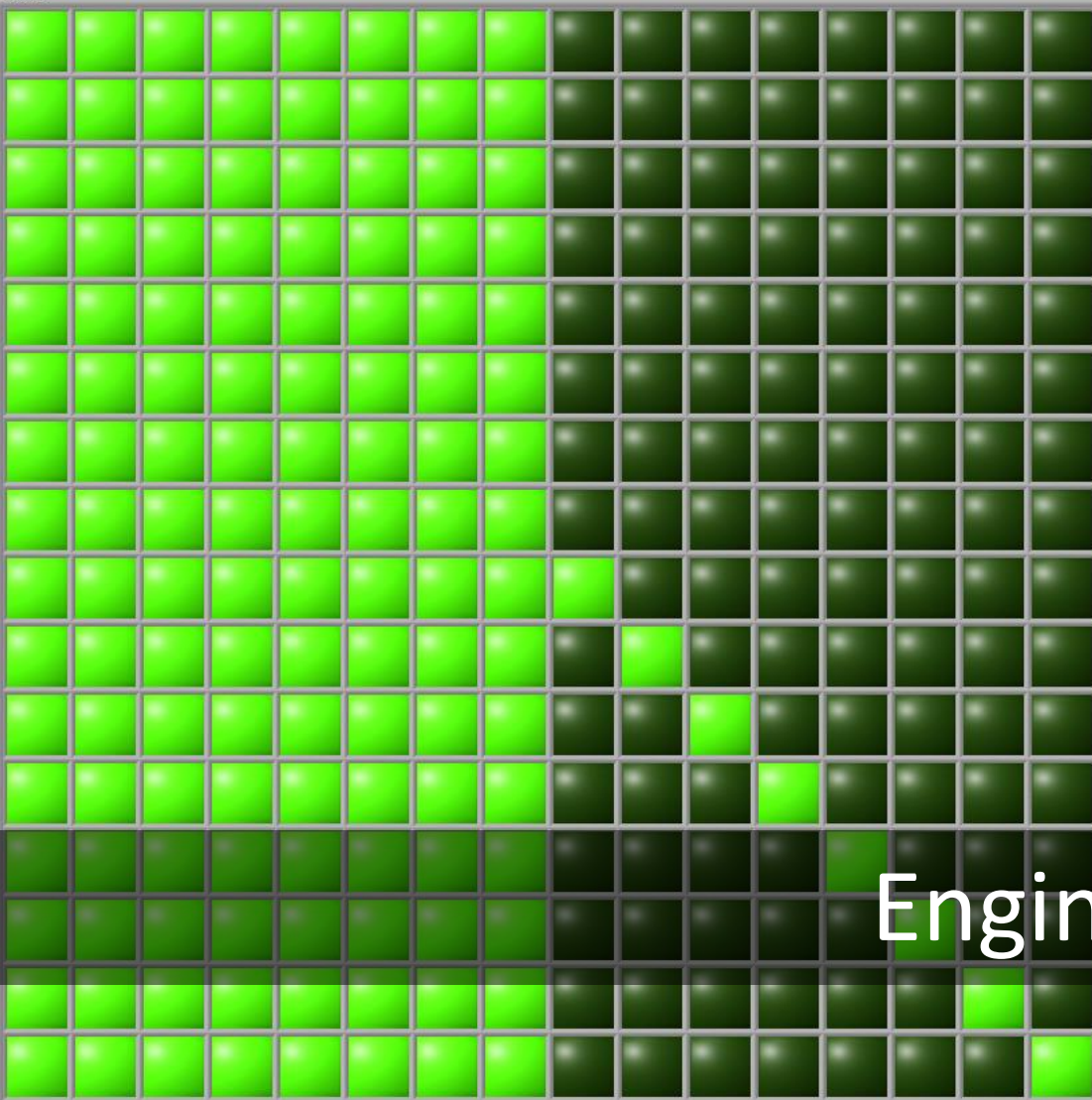
Yellow Indicator - indicates whether testing is in progress

Result

Run section

Run Engineer Service

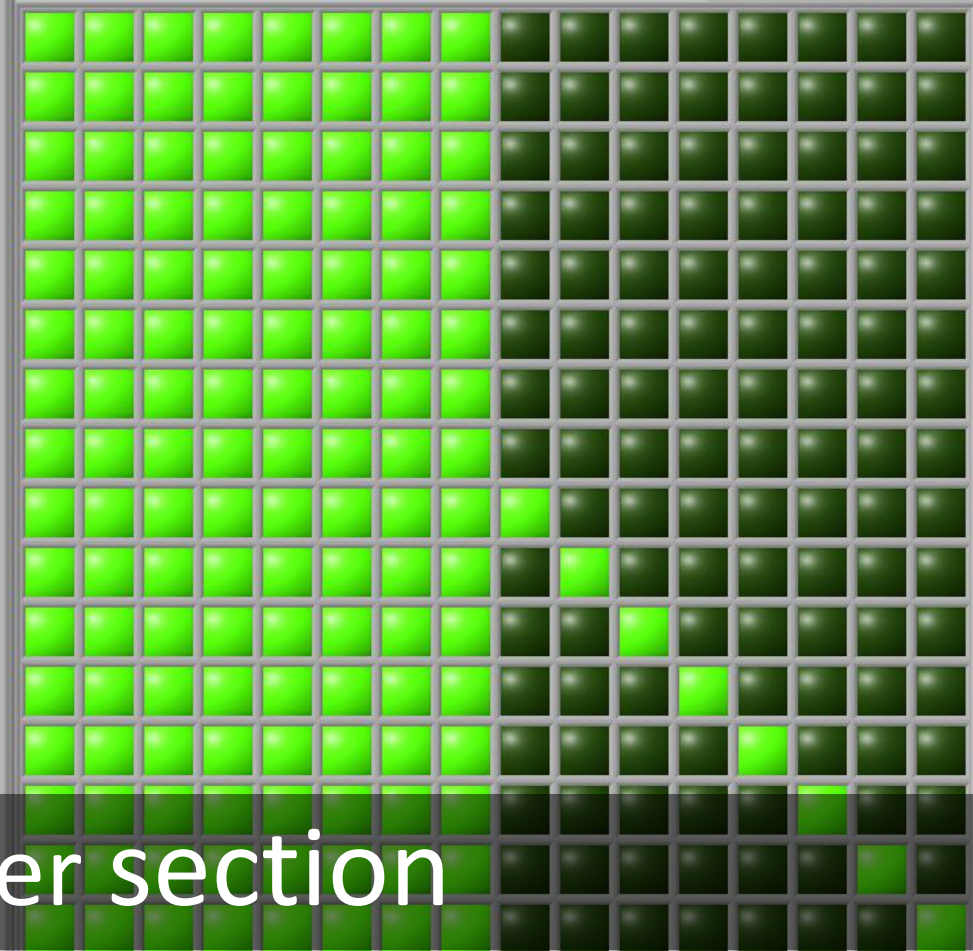
Result



Correct Patterns

3

Bus test



Standard RJ-45

4-Pair RJ-45 Cross

2-Pair RJ-45 Cross

Bus test

Add Pattern Delete Pattern

Start Test Stop


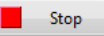
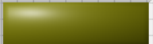
Engineer section

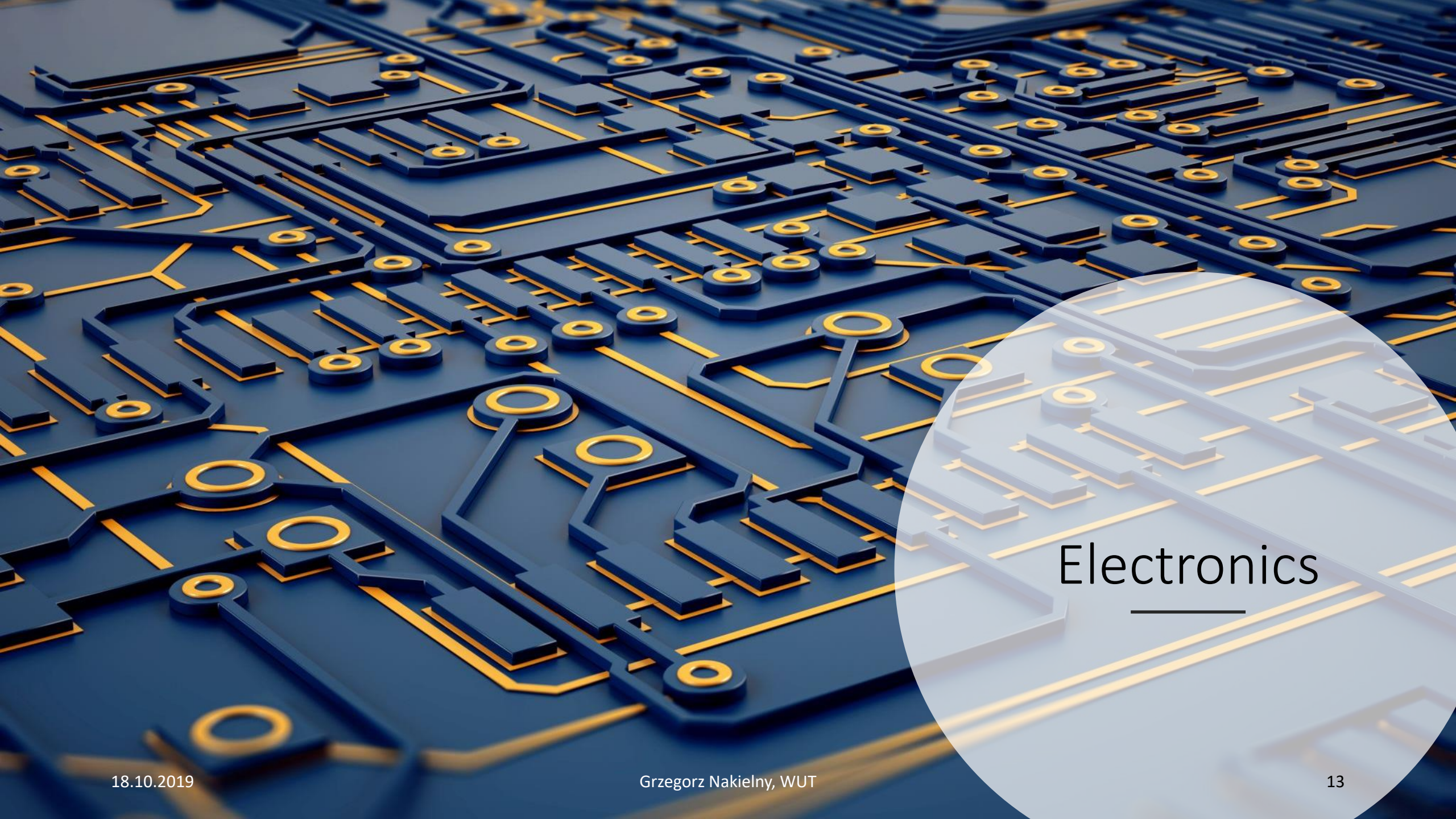
error out

status	code
	0

source

Service section

 Start Test  Stop 

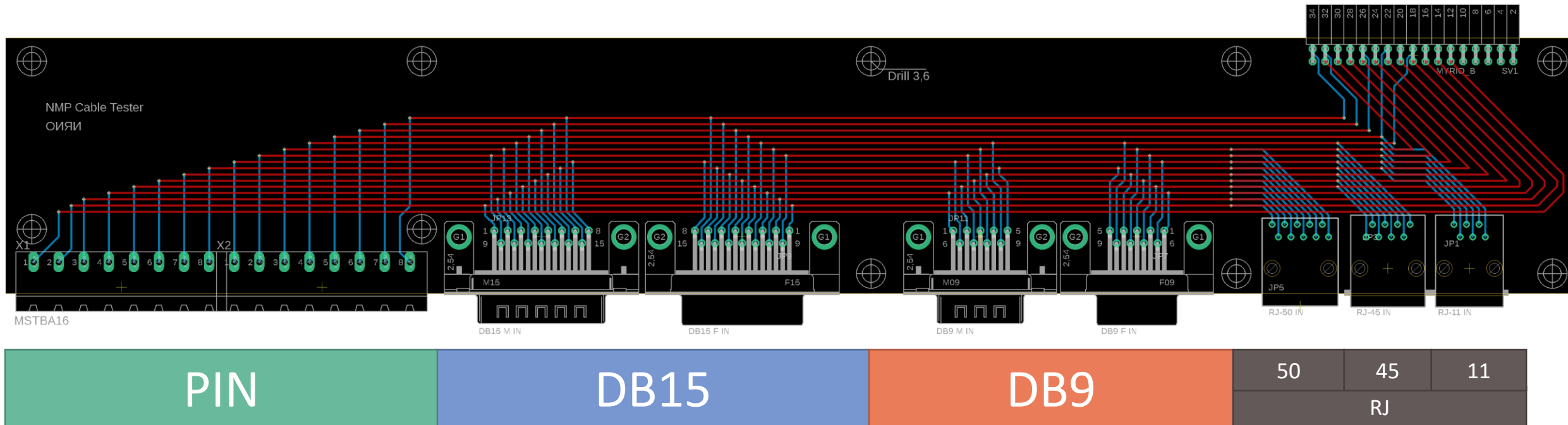


Electronics

Printed circuit board

- 2 layer PCB, with THT-mounted connectors
- Identical PCBs: for input and output lines
- Connected with myRIO MXP connectors using 34-pin ribbon cable

myRIO

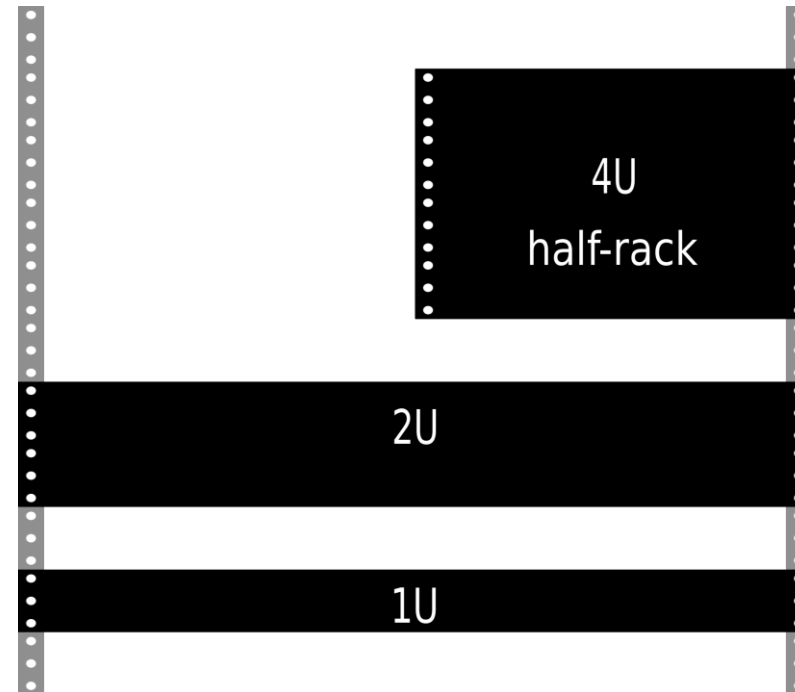
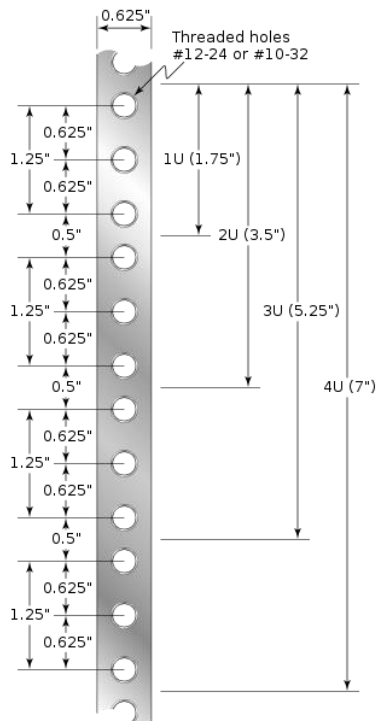




Mechanics

RACK cabinets

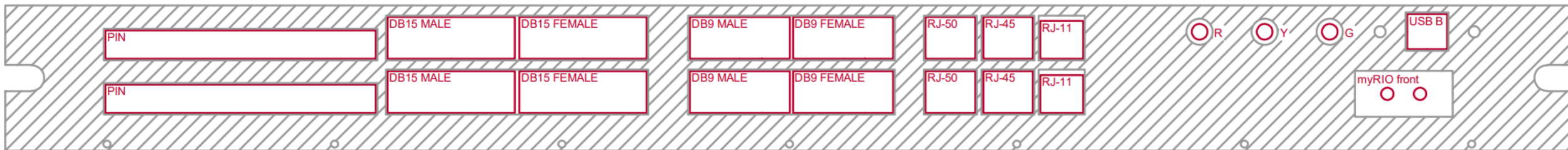
- Standardized mounting of electrical equipment
- Used widely in teleinformatics



Front panel

- Two rows of connectors for cable testing purposes
- LED indicators and physical button for tests without PC
- USB socket for PC-myRIO connection

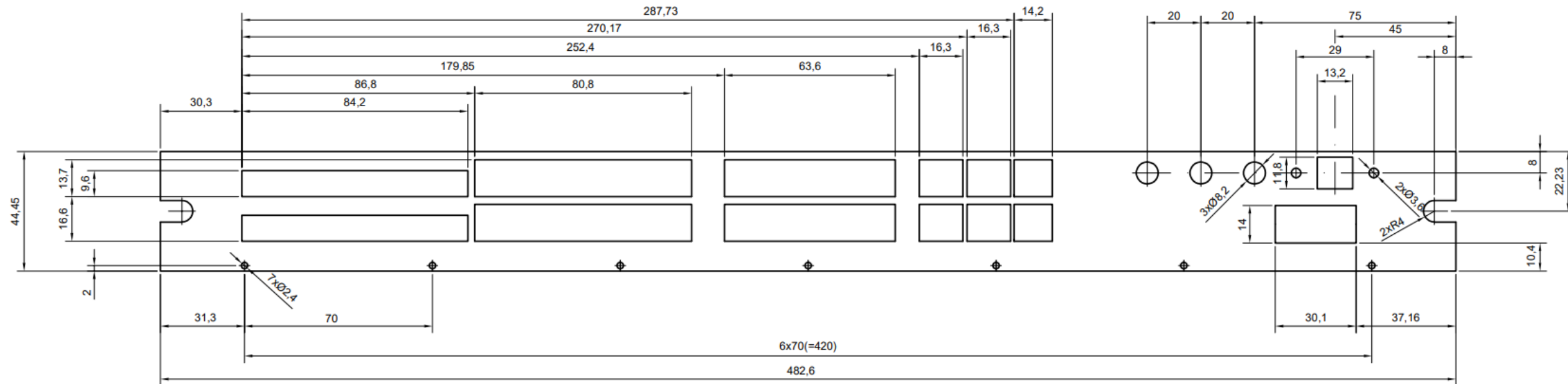
LED Indicators myRIO USB



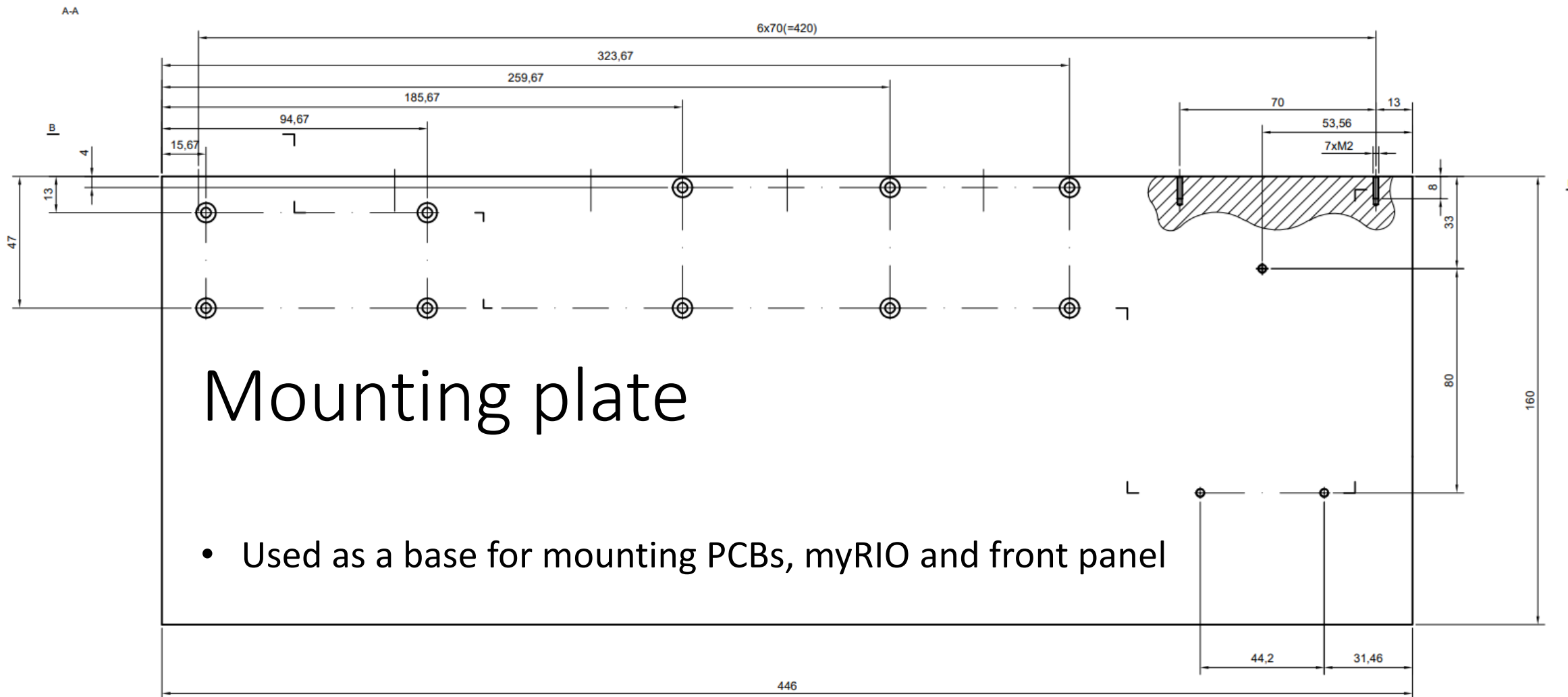
Input/output connectors

myRIO buttons

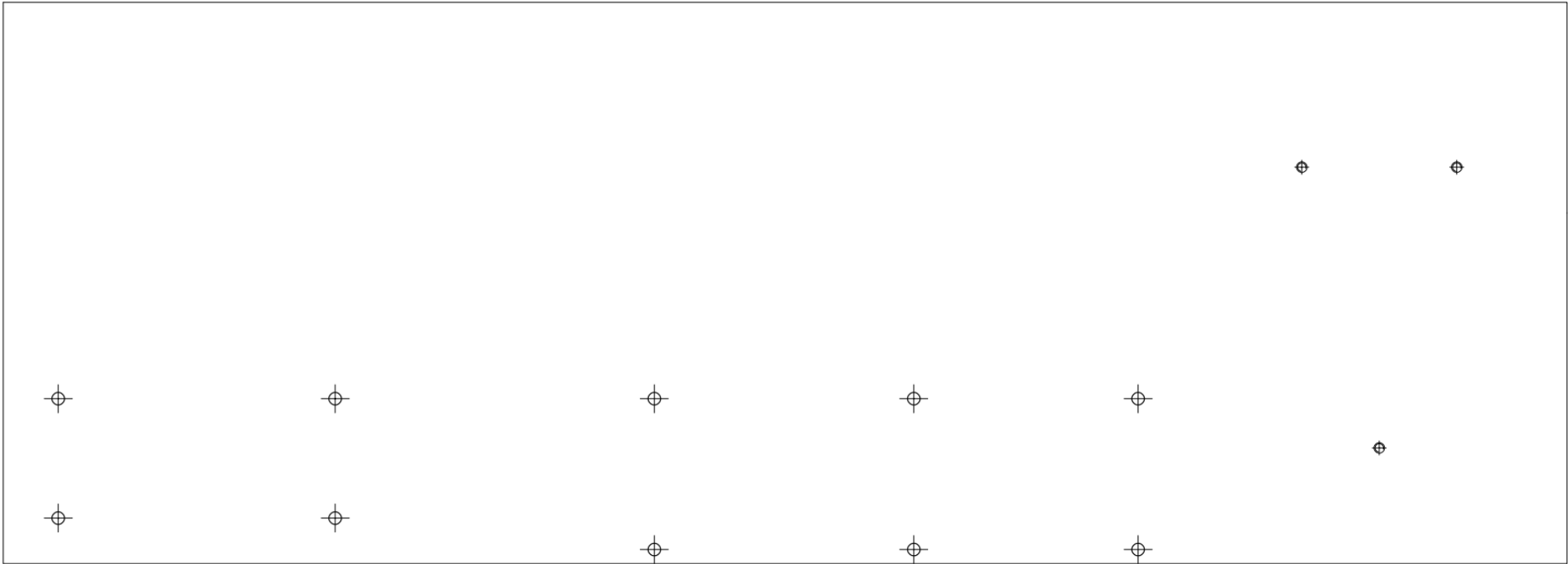
Front panel



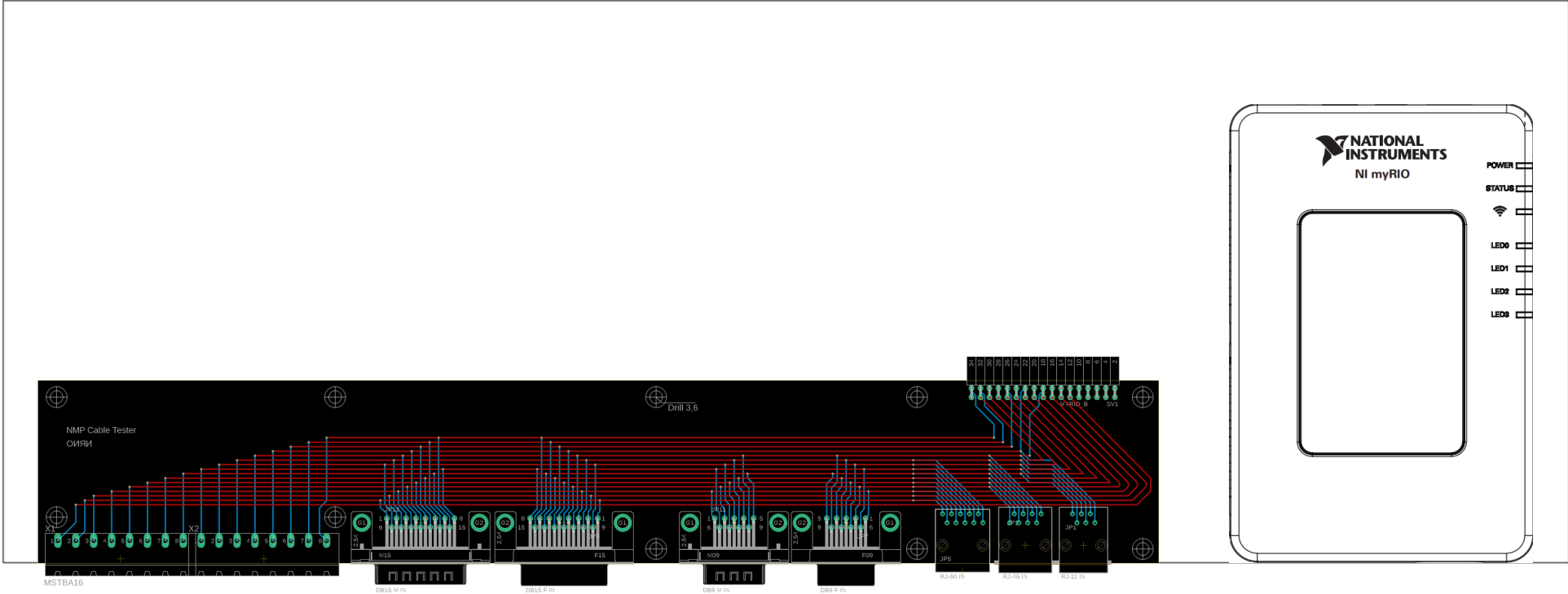
- 1U height – RACK cabinet mounting
- Widened connector gaps for manufacturing imprecisions
- Joined with mounting plate using 7 M2 screws



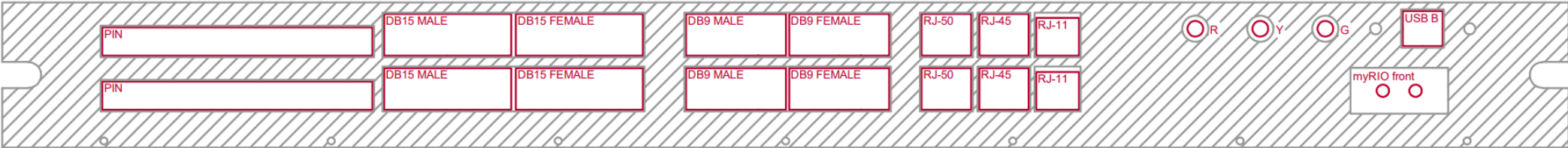
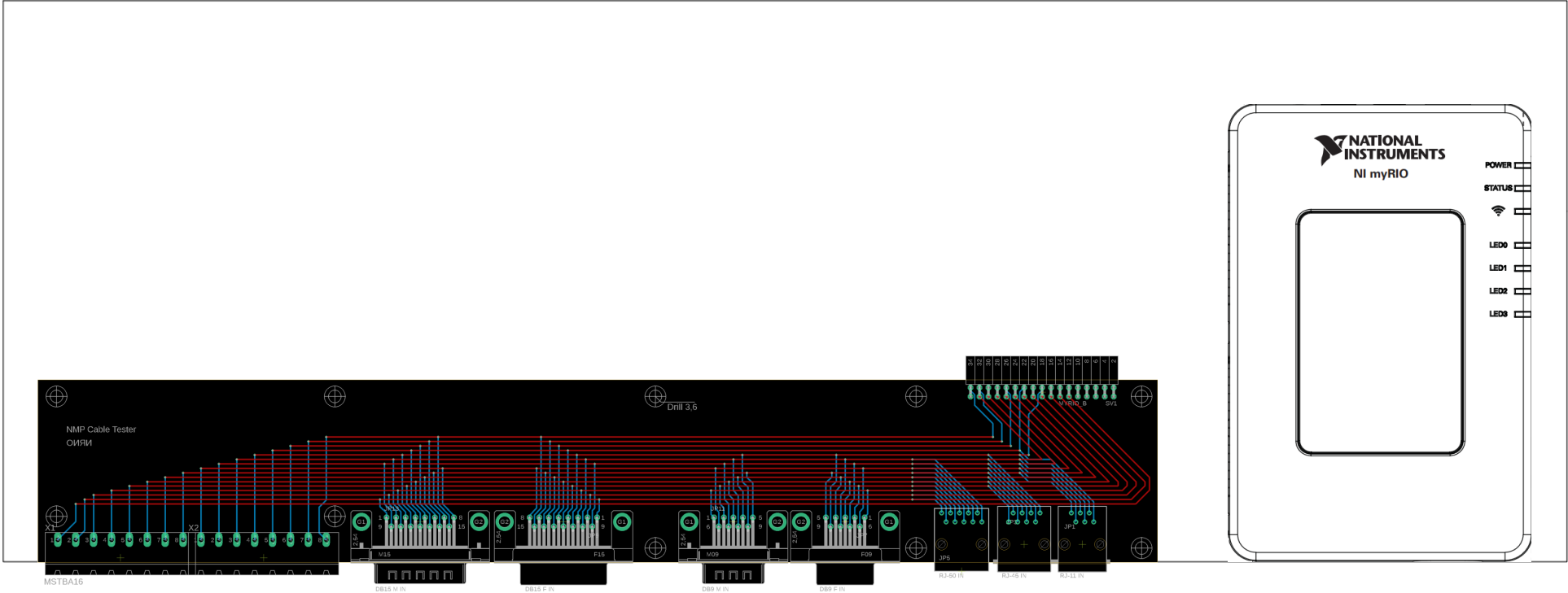
Assembly process



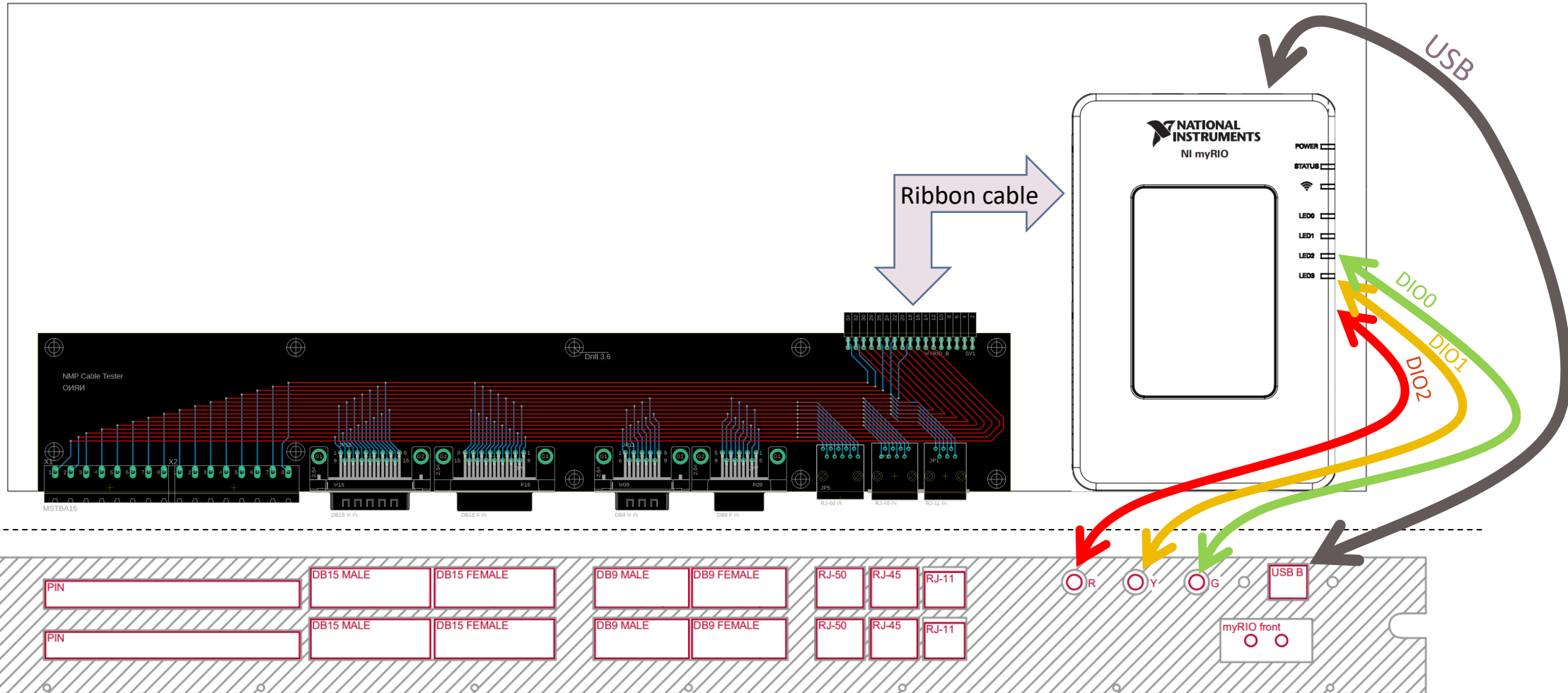
Assembly process



Assembly process



Assembly process





Summary

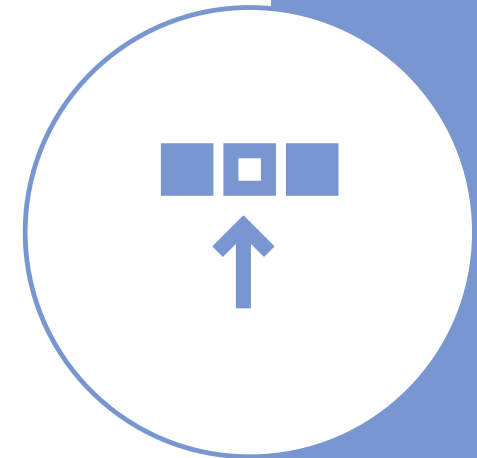
What has been accomplished?

- A complete design of Cable Tester for NICA-MPD Platform, including:
 - Software for myRIO board, made using LabVIEW
 - PCB layout for connecting cables for testing
 - Mechanical details for mounting in standardized RACK cabinets



Tasks to be done

- Manufacturing of a prototype
- Implementation of cable database for integration with EqDb
- Evaluation of designed solution
- Implementation of prototype in NICA-MPD Platform



Thank you for your attention

Grzegorz Nakielny
Warsaw University of Technology
Faculty of Mechatronics
g.nakielny@gmail.com



Warsaw University of Technology

Questions?

Grzegorz Nakielny
Warsaw University of Technology
Faculty of Mechatronics
g.nakielny@gmail.com

