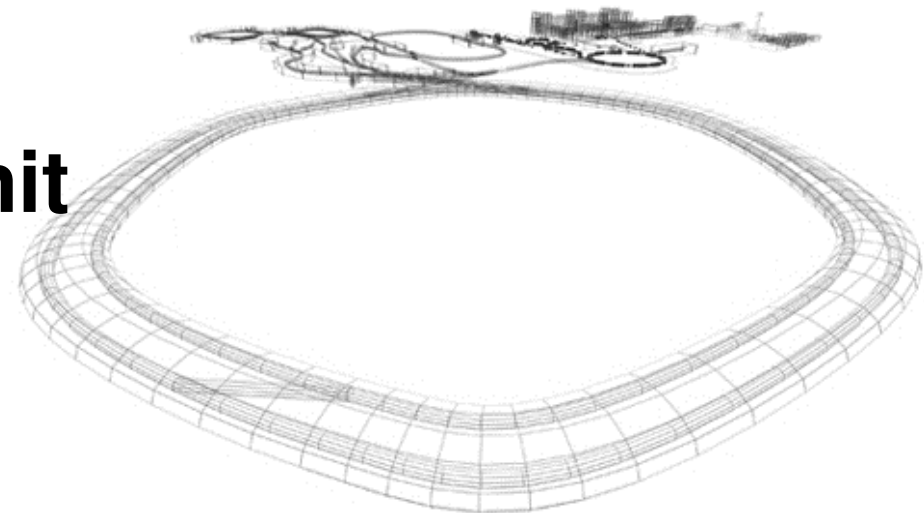


AdaptiveControlUnit

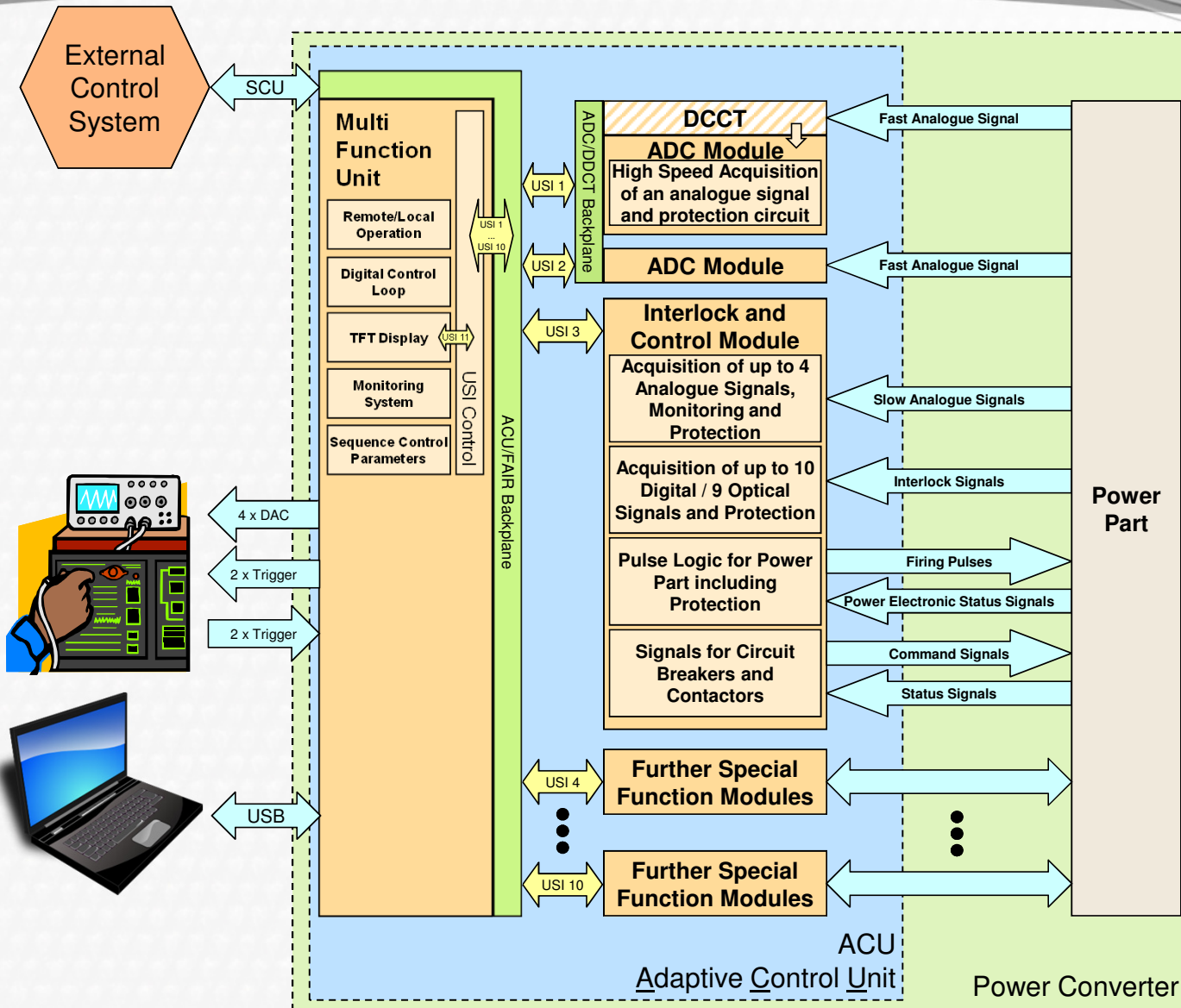
Construction and Function



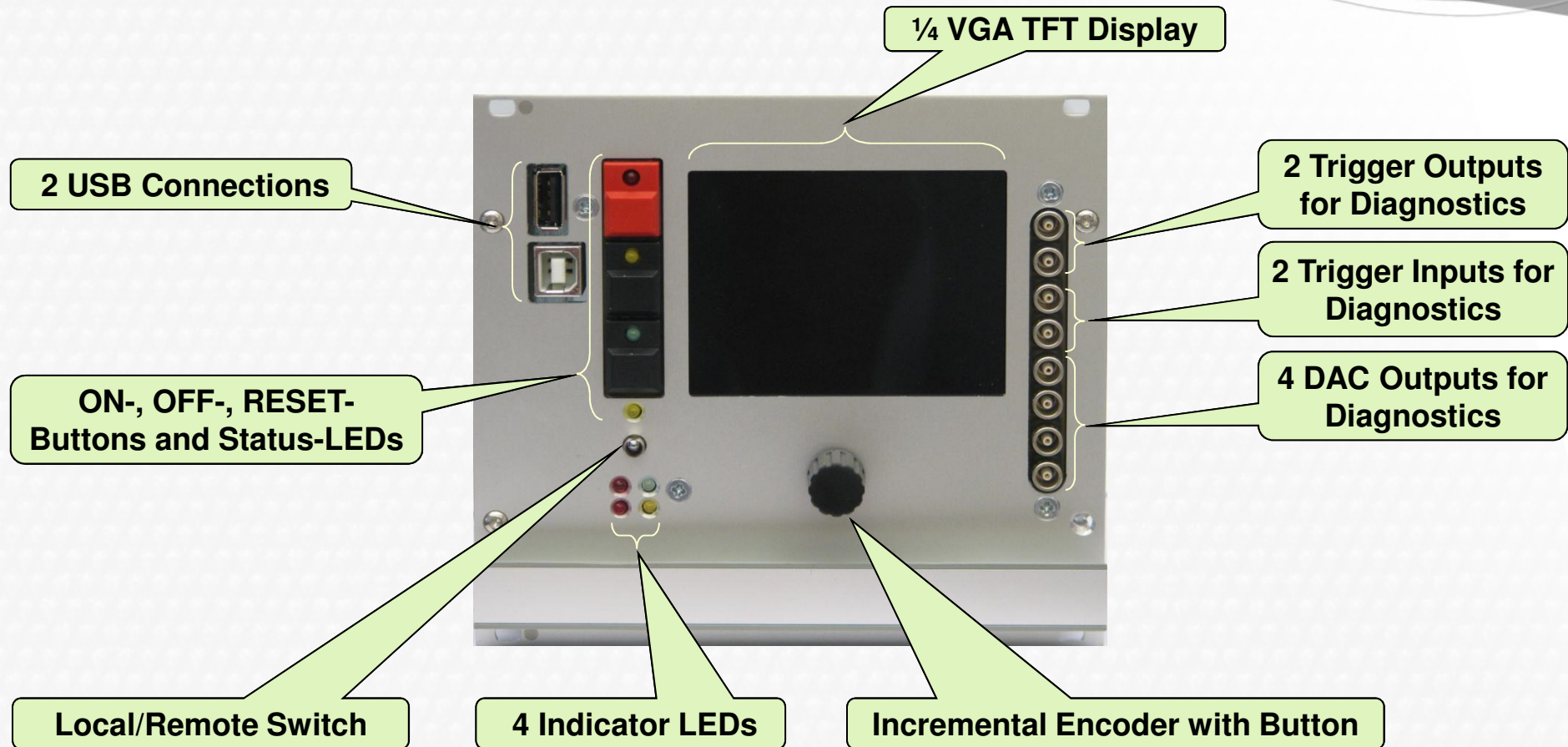
Content

- **Overview**
 - ACU inside a Power Converter
- **System Components**
 - Multi-Function-Unit – MFU
 - Interlock- and Control Module (ILM)
 - Analog/Digital Module (ADC)
- **Communication**
 - Universal Serial Interface (USI)
- **Mounting**
- **Control and Diagnostic Possibilities**
 - via MFU
 - via PC

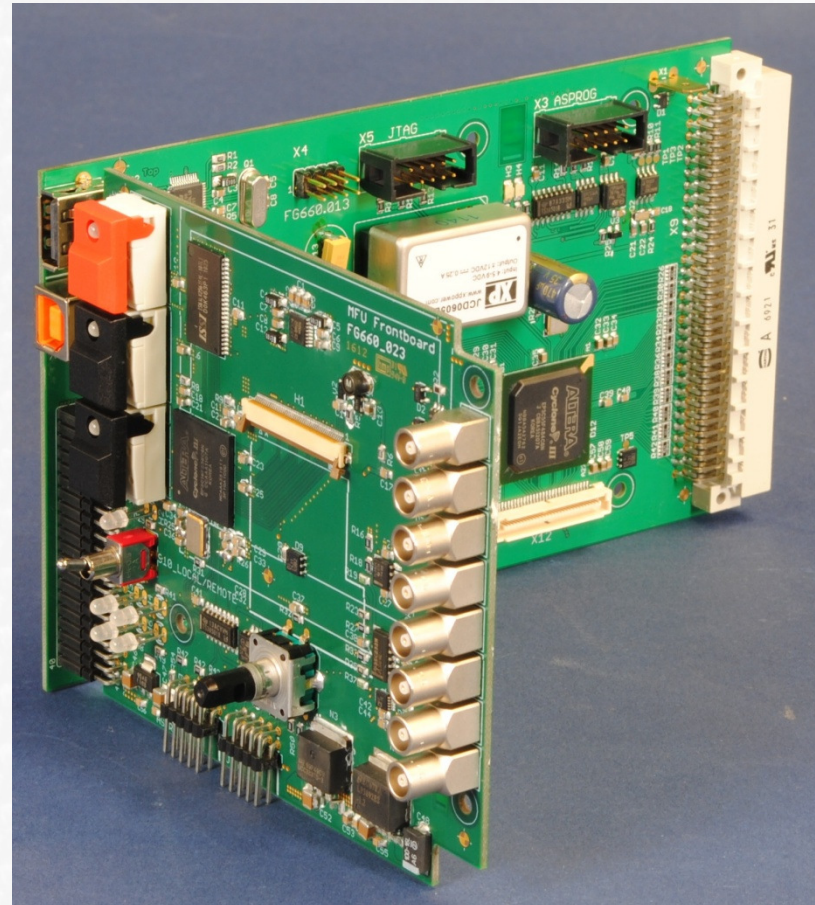
ACU inside a Power Converter



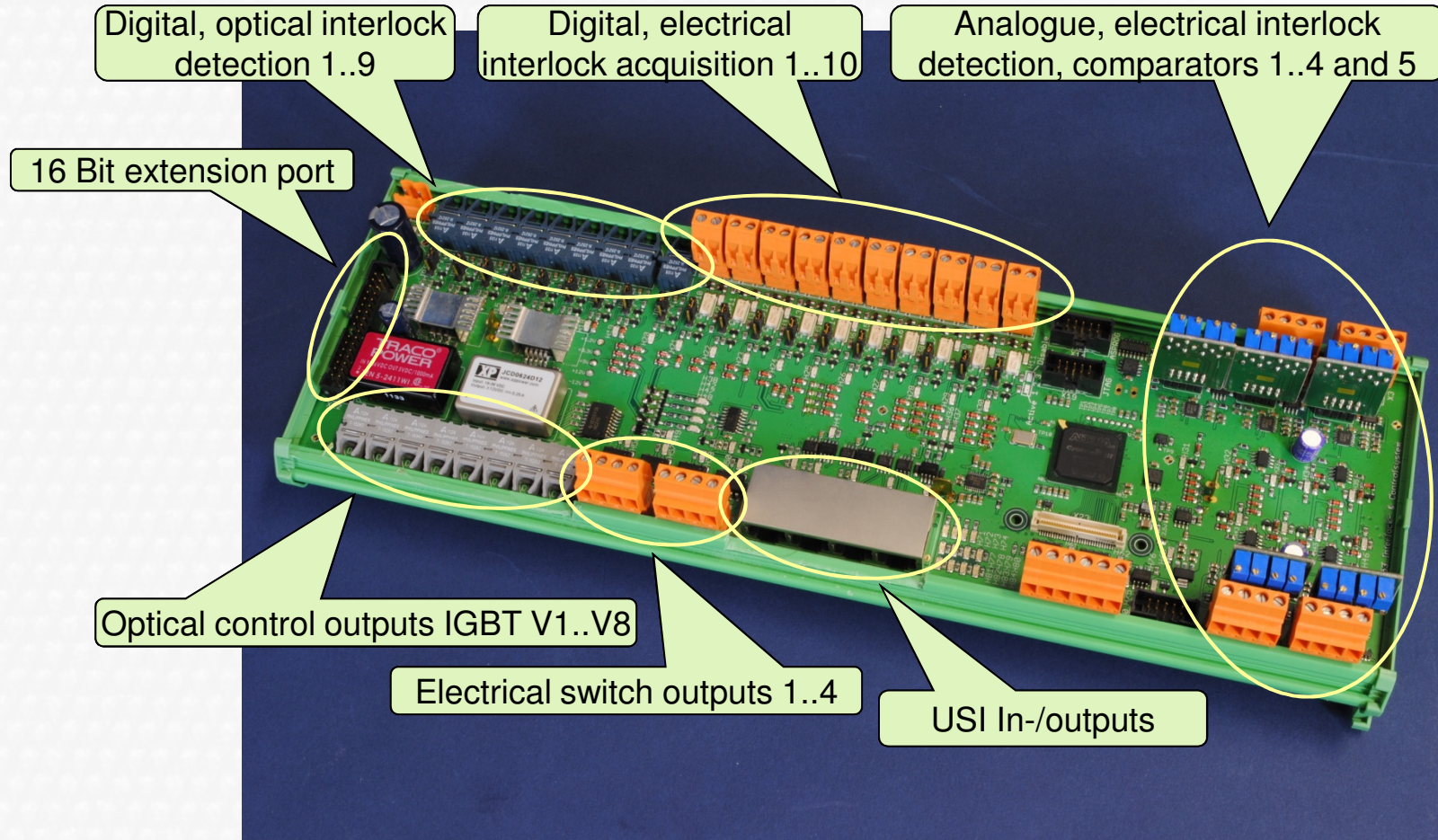
Multi-Funktion-Unit (MFU)



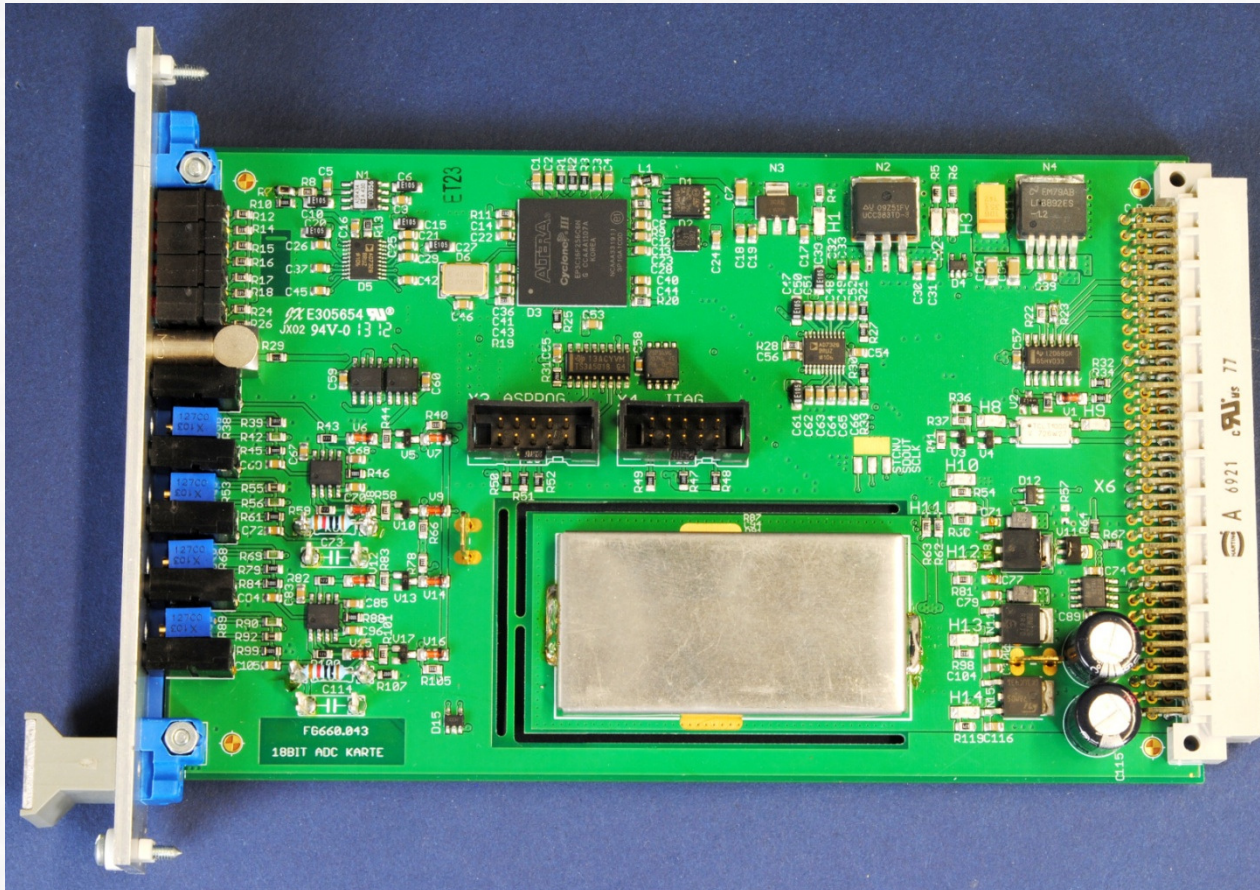
MFU without case



Interlock- and Control Module (ILM)



Analog/Digital Module (ADC)

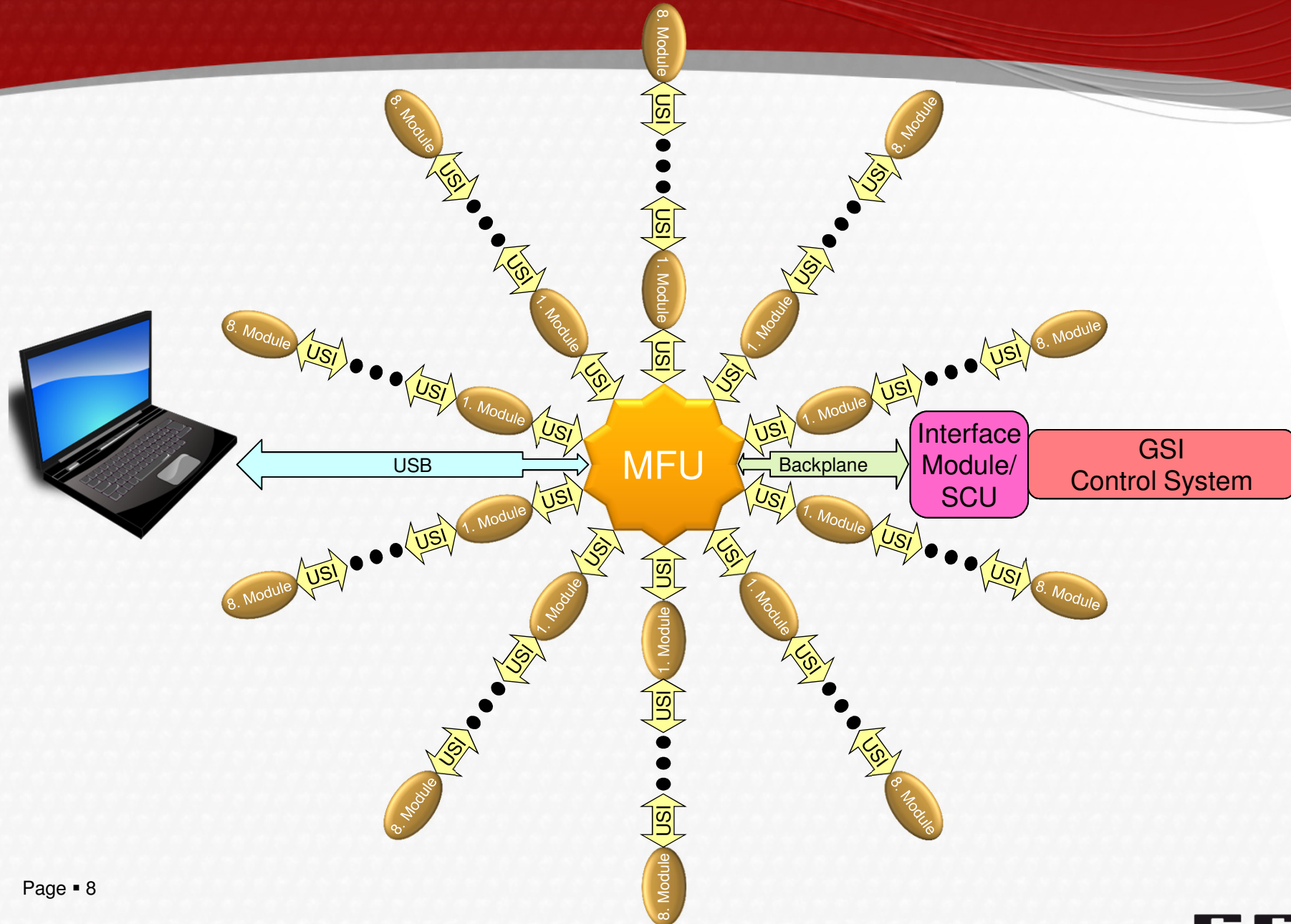


4 Status and 4 Interlock LEDs

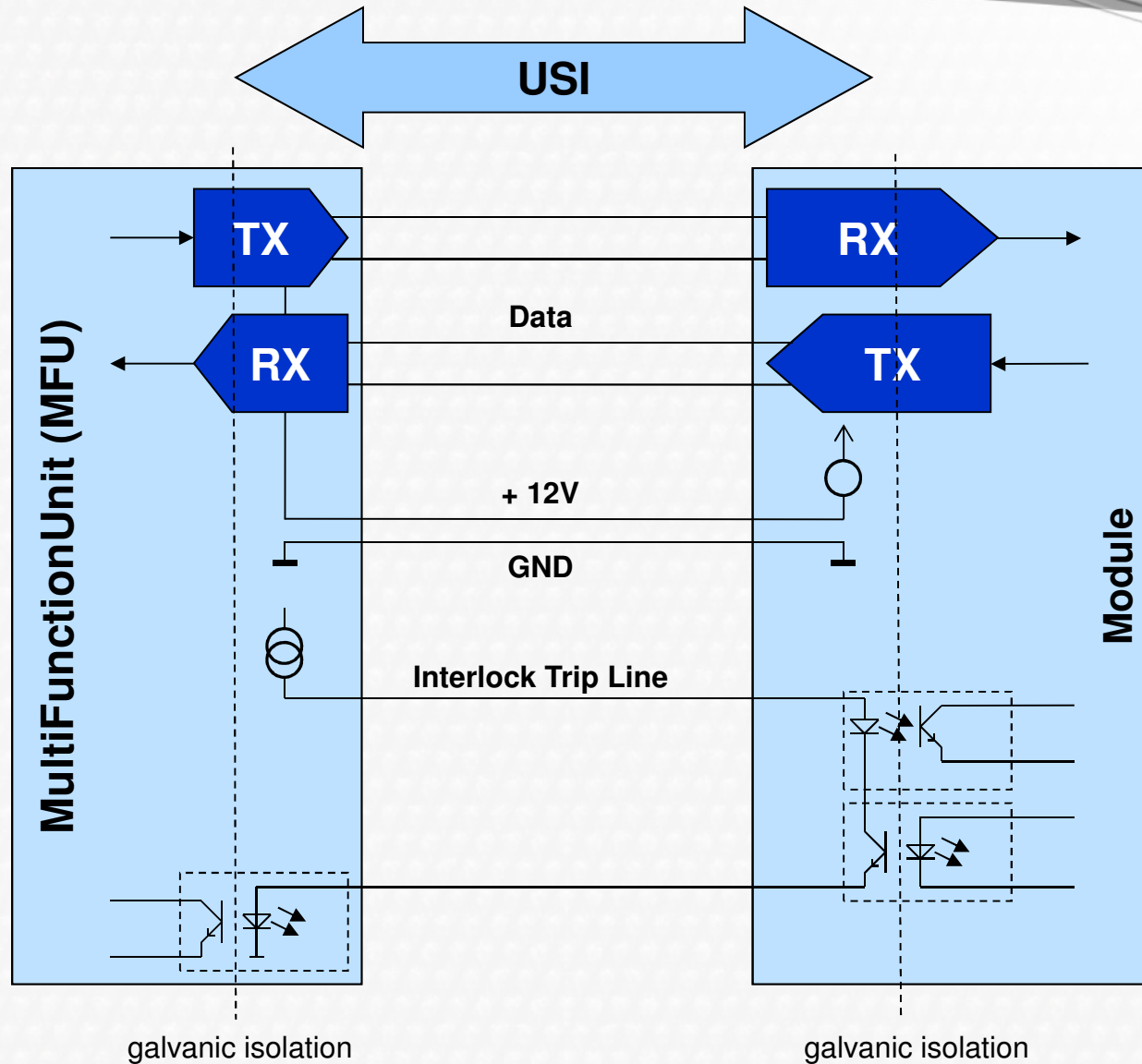
Output Analogue Actual Value

4 Comparator-Thresholds and associated Test Jacks

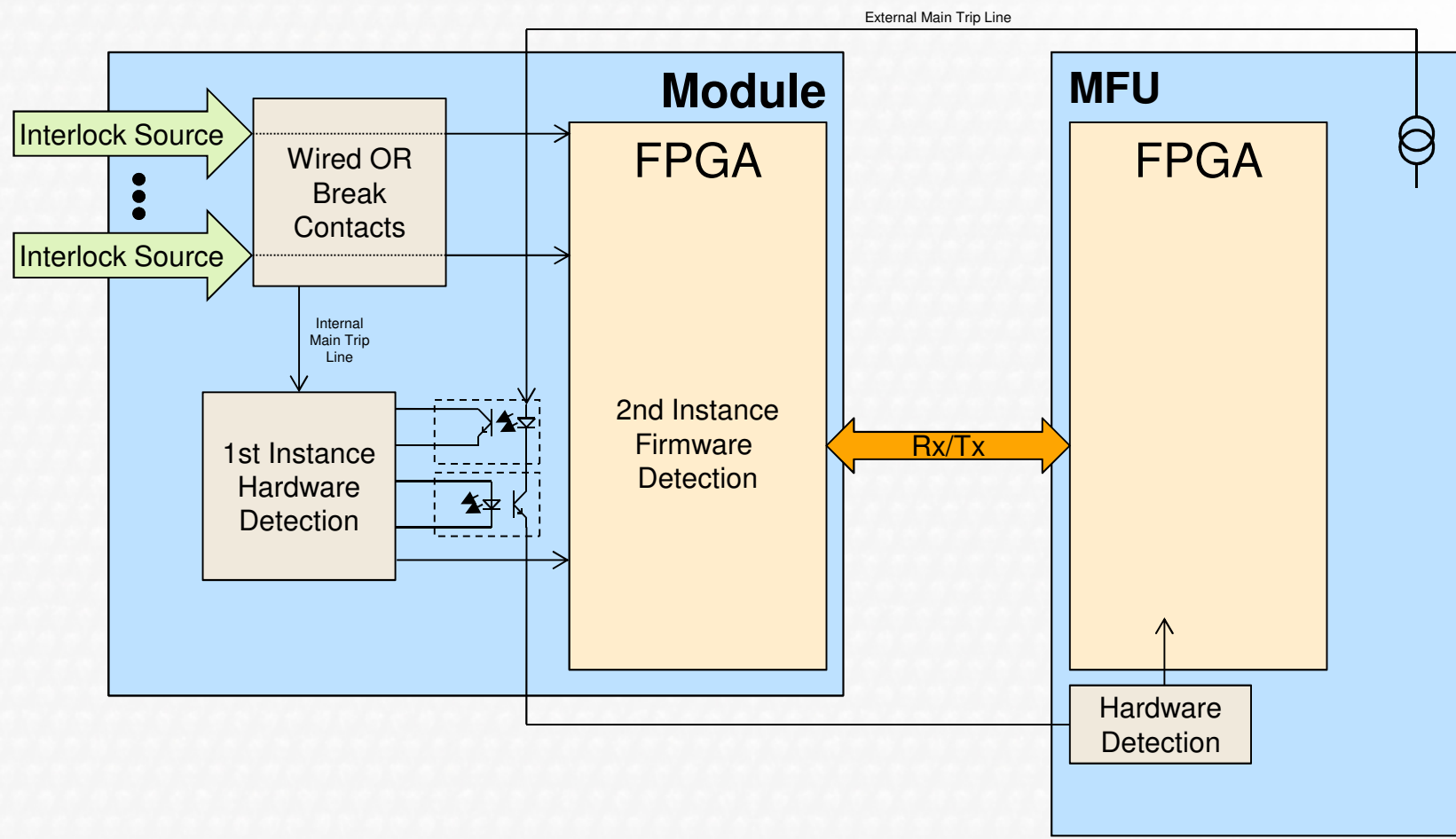
Communication



Universal Serial Interface (USI)



Interlock Trip Line



Universal Serial Interface

- up to 10 external USI interfaces each MFU
- any USI supports up to 8 modules in the maximum
- max. bandwidth 20 MBaud/USI
- Full duplex operating
- Transmission medium: standard network cable
- RS485 interface standard
- ASCII based protocol
- global trip line

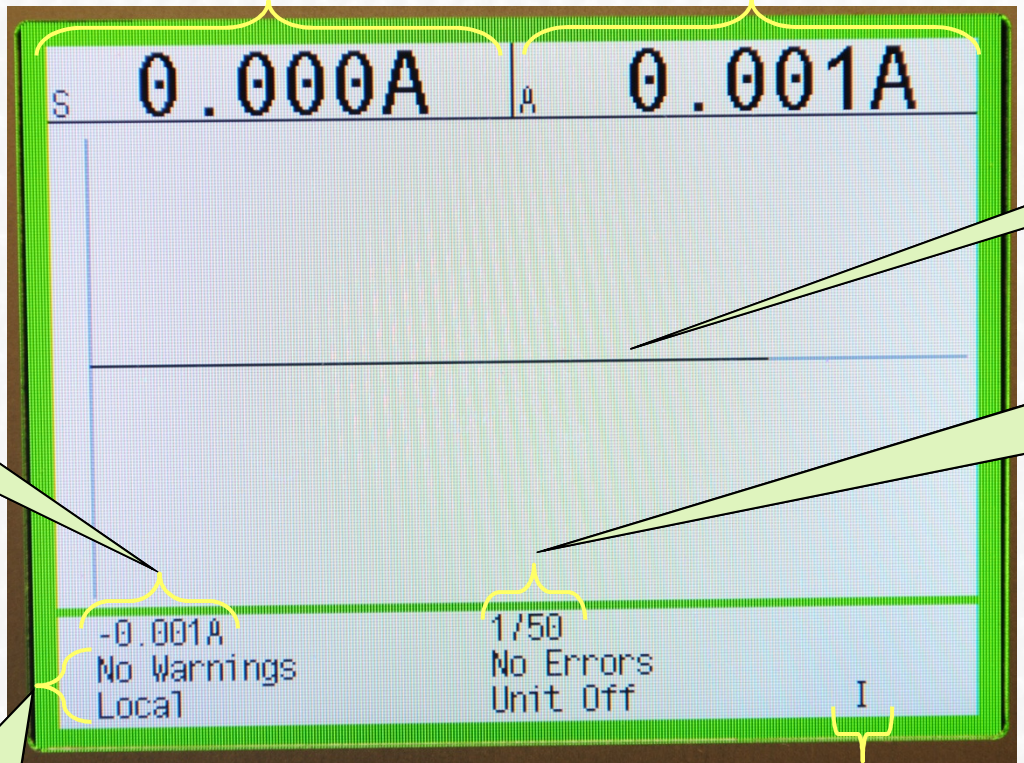
Typical Mounting inside a 19" frame



Control via MFU (Standard Screen)

Current Set Point Value,
adjustable by Incremental Encoder

Current Actual Value



Current Actual Value - graphical

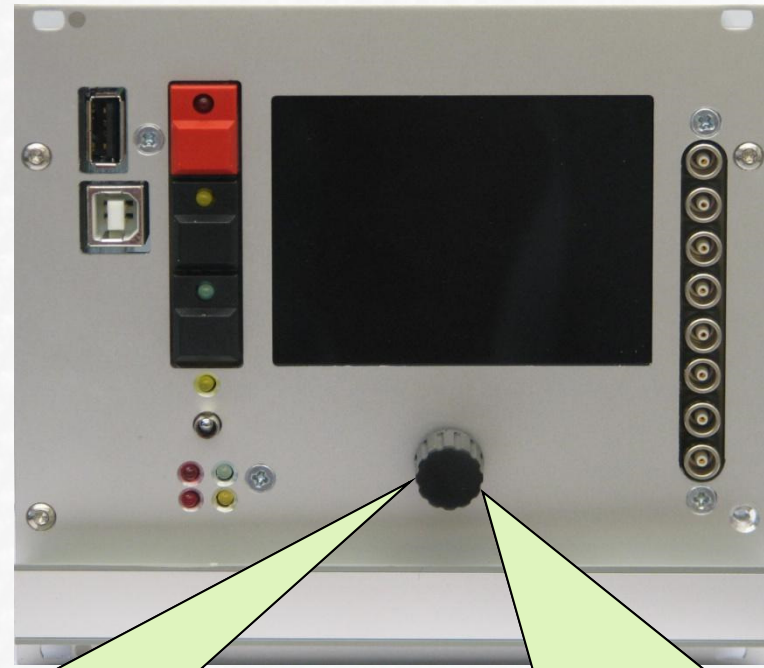
Step Size for Set Point Value setting, switchable by RESET button

Control Deviation

2 Status lines:
Priority, Unit Conditions

E: external parameters in use
I: internal parameters in use

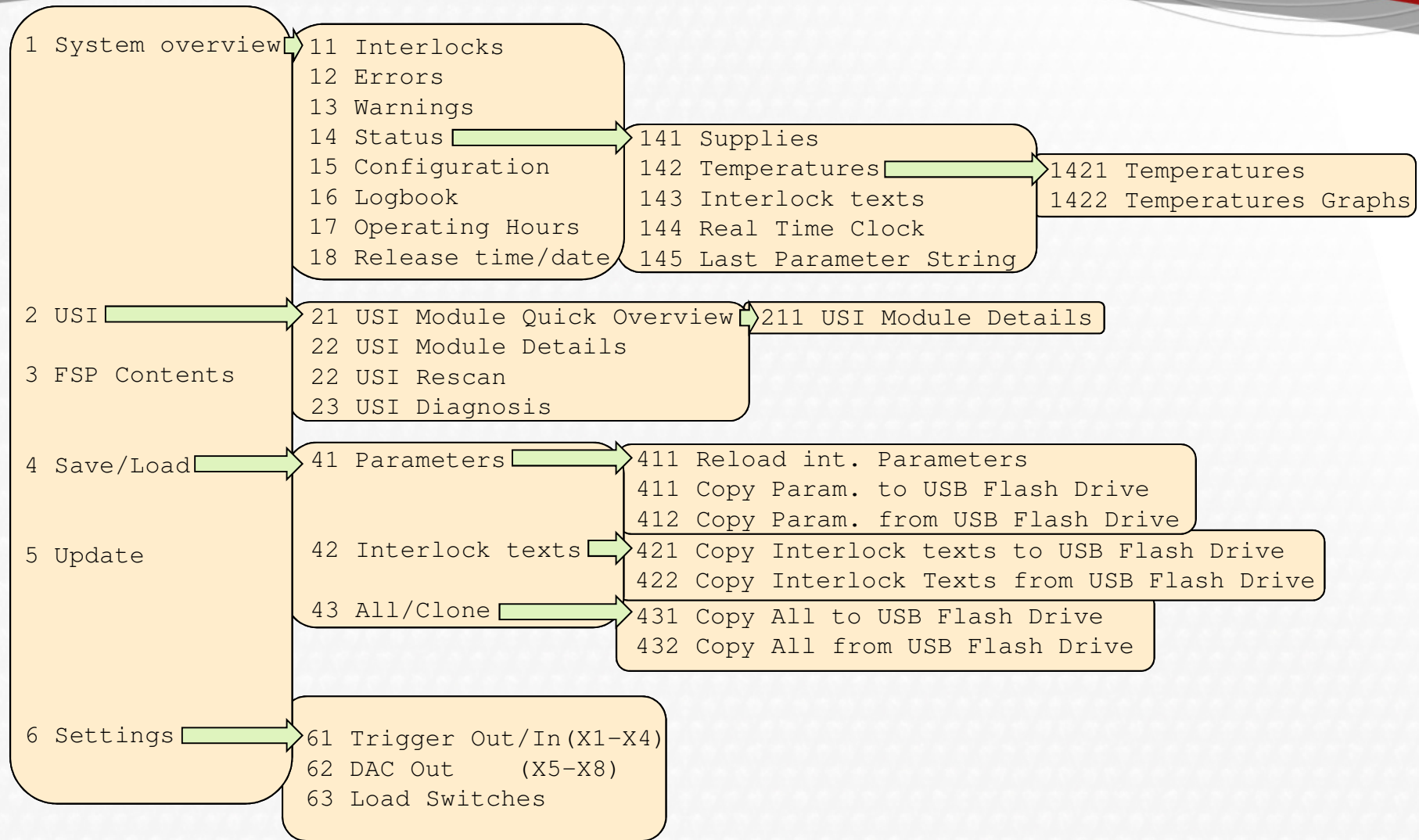
Control via MFU (Incremental Encoder)



Navigation within the Standard Screen
push: call Main Menu
rotate: Current Set Point Value +/-

Navigation within the menu
push short: call/acknowledge/forward
push long: abort/backward
rotate: change/scroll

Control via MFU (Menu)



Control via PC with PowerConfigAdvanced (PCA)

The screenshot displays the Power Config Advanced (PCA) software interface, version 5.1 Modular Version. The main window is titled "MFU Module US1 No.:00 Module No.:00" and contains several tabs: "US1 Configuration", "US1 High Speed configuration", "Environment Data", "Logbook", "Controller Configuration", "PSU Data", "Internal Scope", "Functiongenerator", and "Remote Control / DAC". The "Controller Configuration" tab is active, showing a block diagram of the control system with components like "Slope Limiter", "Multiplier = 1x", "PI Controller 1", "PI Controller 2", "Degauss Comparator", "V5V6 Comparator", "ERL Control", and "U Static Value".

Below the block diagram is the "DAC Configuration" section, which includes four DACs (DAC 1 to DAC 4) with "Disabled" dropdown menus and "Inv." checkboxes. A "Write DAC configuration to MFU" button is also present.

An "Environment Data" window is overlaid on the main interface, showing a "Main ADC Value" of 00,004700V. It includes a "Poti" table with values for 7.25V, 6.93V, -10.80V, and -2.62V, and a "Comp." column with values of -0.01V. The window also displays a circuit diagram with temperature readings (36°C, 39°C, 36.8°C, 31°C) and a "Supply Digital" table:

Supply Digital	Value	Supply Analog	Value
+1.2V	0.00V	+5.0V	0.00V
+3.3V	0.00V	+12.0V	0.00V
+2.5V	0.00V	+5.0V	0.00V
		+12.0V	0.00V
		+2.75V	0.00V

At the bottom of the interface, a status bar shows: "USB Port: active Sendcounter:0638 / Writecounter:0638 / TimeOut:Count:0 / US1 Load:003% AutoSave = OFF G:\Work\SWN_EET1\CODEWork\prj\VisualBasic\Power_Config_Advanced\5\PCA-DATA\TESTGERÄT\Config_Files\TESTGERÄT.XPC3".

Control via PC with PowerConfigAdvanced (PCA)

- Unit parameterizations
 - common parameters
 - select signal source
 - remote control
 - adjustable gain of differentiator
 - edit PI controller
 - sources selection for adder
 - comparators for voltage link correction
 - PWM configuration
 - adjustable slope limitation
 - parameterization of system components

The image displays four overlapping windows from the PowerConfigAdvanced (PCA) software interface:

- Allgemeine Parameter:** A main configuration window with multiple tabs. The 'Gerätedaten' tab is active, showing fields for device type (SVE 45 Ua1 1), manufacturer (EP3581), drawing number (Z6021), and various electrical parameters like inductance (8,700 mH), resistance (8,700 mΩ), and current limits (170,000 A).
- Signalherkunft 1:** A window for signal source configuration, showing 'Sollwert' (setpoint) as 'MUX A' and 'Istwert' (actual value) as 'A'. It also includes an 'ADC Mittelung' (ADC averaging) setting of '16x gemittelt'.
- PI_REGLER_EDIT_1:** A window for editing PI controller parameters. It shows 'kP1' (40,000), 'kP2' (0,000), 'UaMAX' (10,000 V), 'UaMIN' (-10,00 V), and 'Ukein' (1,000 V).
- Slope_Limiter:** A window for slope limitation, showing a slope of '0 mS/10V', 'UaMAX' (0,000 V), and 'UaMIN' (0,000 V).
- PWM:** A window for PWM configuration, showing 'Betriebsart' (Chopper VE), 'Frequenz' (20kHz), 'Reglersperre' (RSP = UaRSp), and 'Totzeit V1-V4' (0,5µSek).

Control via PC with PowerConfigAdvanced (PCA)

- Diagnostic tools
 - internal oscilloscope
 - source selection for DAC diagnostic outputs
 - source selection for Trigger in-/outputs
 - internal function generator
 - show operating voltages
 - logbook
 - control incidents
 - interlocks
 - errors inside unit (Software)
 - events (Hardware)

The screenshot displays three overlapping windows from the PowerConfigAdvanced (PCA) software:

- DAC konfigurieren:** A window for configuring DAC channels. It lists DAC CH1 through DAC CH4. DAC CH1 is set to 'Funktionsgenerator', DAC CH2 to 'Istwert_A', DAC CH3 to 'Regel_Differenz', and DAC CH4 to 'ADDIER_STUFE'. There are checkboxes for 'Inv.' and a 'Senden' button.
- Funktions Generator:** A window for configuring a pulse generator. It is set to 'PULS MODE'. Parameters include 'Puls Wert' (2,000 V), 'Puls Zeit' (200 mS), 'Pause Wert' (0,500 V), and 'Pause Zeit' (2000 mS). A 'Senden' button is present.
- Logbuch:** A logbook window showing a table of events. The table has columns for 'Nr.', 'Art', 'Daten', 'Beschreibung', and 'Uhrzeit / Datum'. The log contains various entries such as 'Logbuch aus MFU gelesen', 'Verbindung per USB mit dem PC hergestellt', and 'Interlock ausgelöst'. At the bottom, there are buttons for 'Lese Logbuch aus MFU', 'Logbuch speichern', 'Logbuch laden', and filter options for 'Filter Normal', 'Filter Event', 'Filter Error', and 'Filter Interlock'.

Control via PC with PowerConfigAdvanced (PCA)

- further functions
 - semi-automatic, guided bringing into service
 - save parameters
 - create and save interlock texts
 - create acceptance certificates
 - calibrate ADC modules
 - MIL BUS remote control

Concluding Information

Thank you