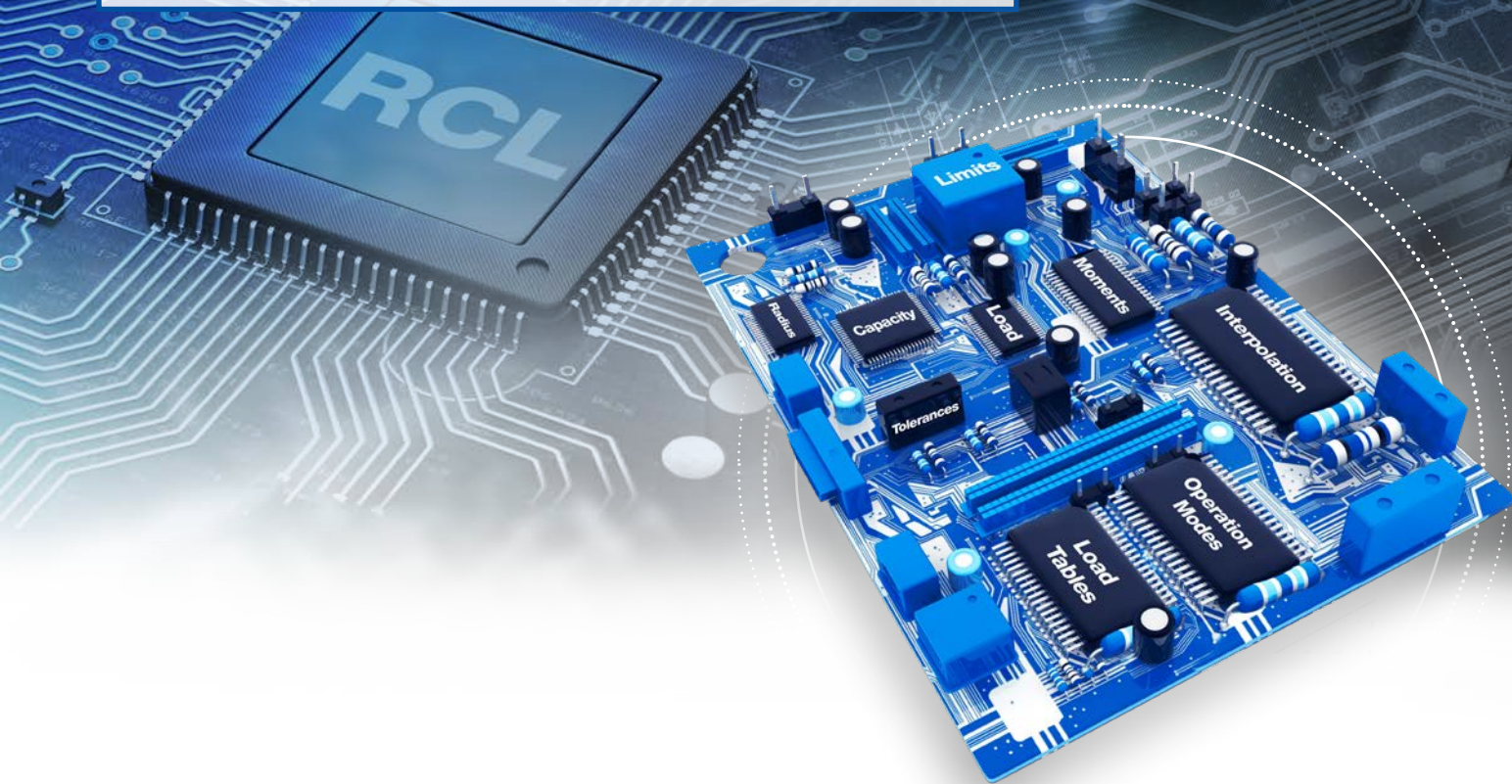# qSCALE RCL trueSafety

A certified software library for rated capacity limitation in telescopic cranes

Benefit from the state of the art in technology!

true SAFETY®

WIKA
MOBILE CONTROL

qSCALE RCL trueSafety: the First Certified Software Library

For designing safe systems for mobile cranes

For telescopic cranes of the following types:

↗ **Boom-only**

↗ **Fixed jib**

Give your telescopic cranes certified safety – with qSCALE RCL trueSafety, the first-ever certified software library for these applications. We're focused on the future of your safety-relevant applications. As experienced specialists in load moment indication (also known as rated capacity limitation = RCL) for mobile cranes, we regularly set new, innovative standards.

Our development processes are continually geared to what you'll need to optimize safety going forward. Currently there's an intensifying focus on certified software solutions. We're committed to helping you integrate safety products into new mobile cranes in order to comply with the requirements of the European Machinery Directive (206/42/EC) as well as the type B-1 ISO 13849 standard and the IEC/EN 62061 implementation of IEC/EN 61508.

Take advantage of our holistic approach! Now you can get not only proven certified hardware (controller and sensors) with **qSCALE RCL trueSafety**, but also the right software solution for ensuring certified rated capacity limitation in your cranes.

Benefit from the state of the art in technology: **with outstanding software for our safety-oriented mobile controller, certified as ISO 13849-compliant.**
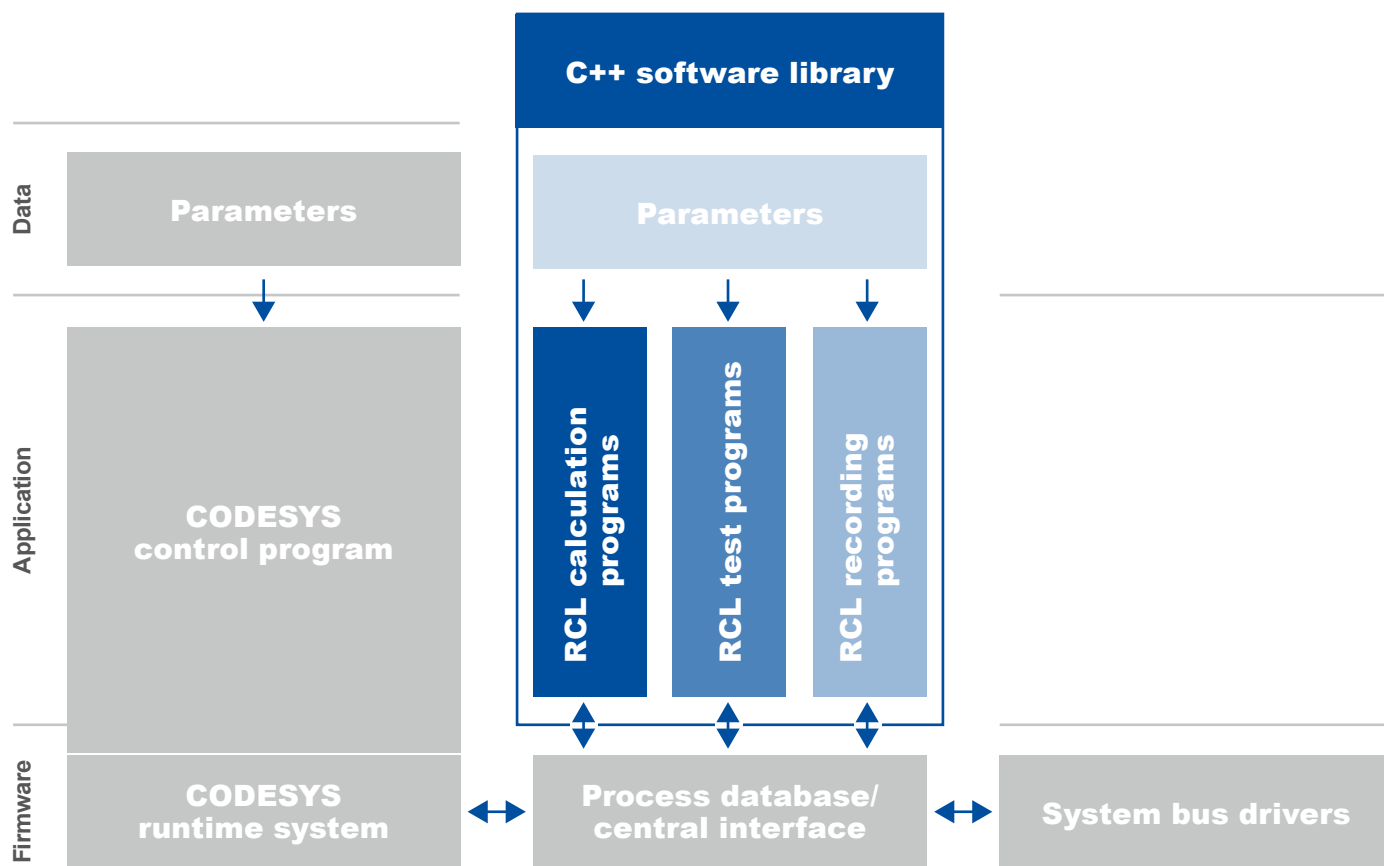
↗ The qSCALE RCL trueSafety Development Process

We've built our RCL C library to maximize functional reliability in accordance with the latest EU standards. To make sure you stay in safe territory, we've had our entire development process certified and all documentation for the specifications, architecture, module descriptions, and module and integration tests reviewed. And we've also taken the extra step to put our entire library through its paces with actual machine data from your industry – with first-rate evaluations across the board!

The qSCALE RCL trueSafety library for certified rated capacity limitation includes the following:

1. an RCL calculation program

2. an RCL test program

3. an RCL recording program.

Count on it: the system architecture of all RCL functions for every application used in mobile cranes is certified on all three levels and complies with PL d according to ISO 13849.

All programming as well as the entire secure software development life cycle process is ISO 61508-compliant.
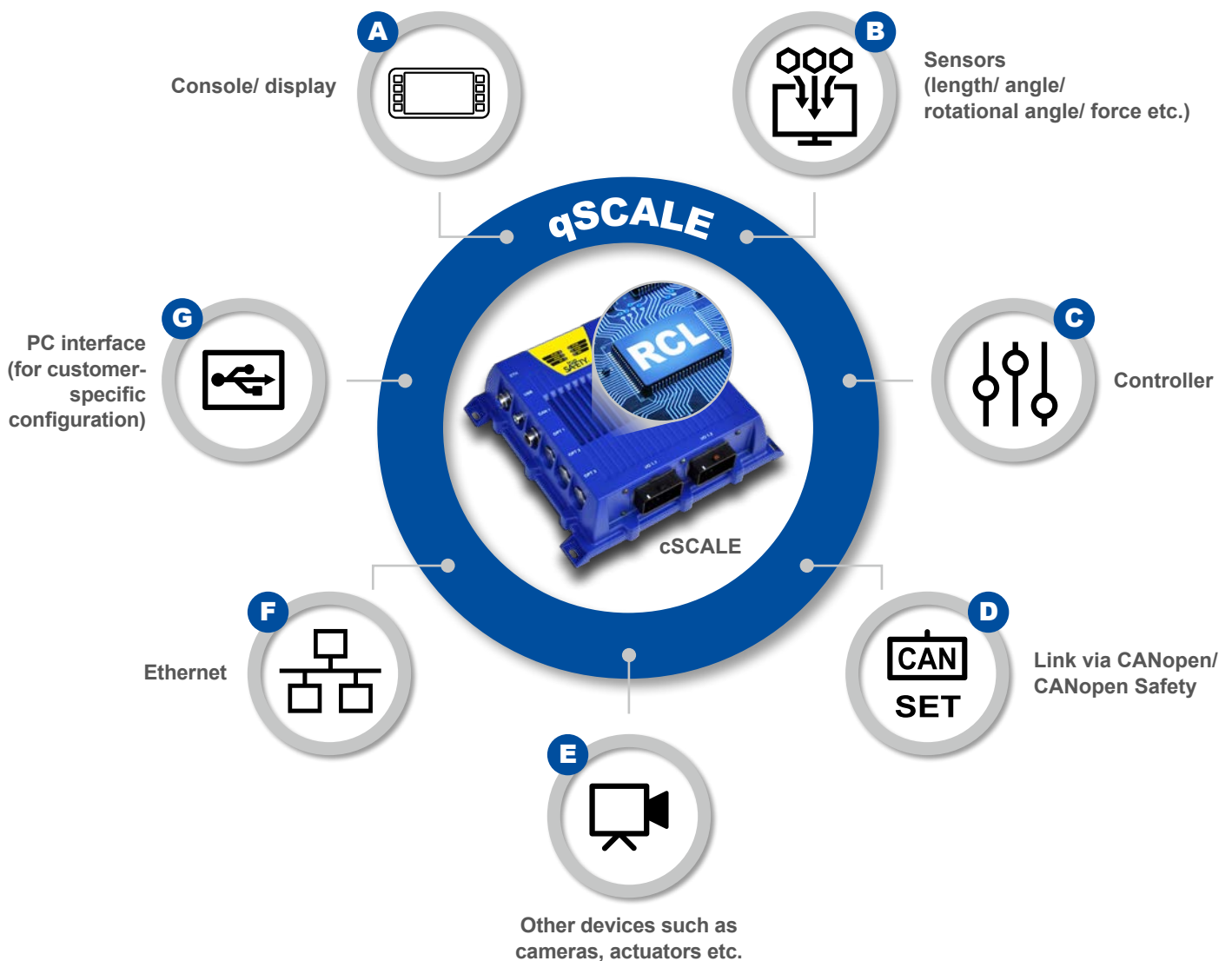
↗ **Folding or luffing jib**

↗ **Superlift**

C++ software library

Data

Parameters	**Parameters**

Application

CODESYS control program

RCL calculation programs

RCL test programs

RCL recording programs

Firmware

CODESYS runtime system	**Process database/ central interface**	**System bus drivers**

The RCL calculation library and corresponding tools give you a vetted basis for quick and easy certification of applications and machines.

System Integration

Greater flexibility with custom-tailored safety

The modular cSCALE controller with integrated rated capacity limitation, also known as qSCALE, is the system's centerpiece. To preserve your flexibility, we integrate the qSCALE safety solution in your tailored safety application. It's also possible to flexibly combine it with any desired third-party hardware components.

↗ **The system:**
qSCALE + (non-proprietary) hardware

A Console/ display

B Sensors (length/ angle/ rotational angle/ force etc.)

qSCALE

RCL

cSCALE

G PC interface (for customer-specific configuration)

C Controller

F Ethernet

E Other devices such as cameras, actuators etc.

D CAN SET — Link via CANopen/ CANopen Safety

Sx Configurator

Flexible parametrization of rated capacity limitation

The Sx Configurator is a Windows-based, menu-driven parametrization tool
for customer-specific configuration of the controllers of mobile cranes with RCL.

The Sx Configurator is used to generate parameters for the certified qSCALE RCL
trueSafety software library.

❶ General data

- Crane manufacturer
- Crane type and/ or model
- System of units (metric or U.S.)
- Staff ID

Current project	
Crane model:	Testcrane
Manufacturer:	WMC
Last modified:	2/26/2020 10:38:59 AM
Last modified by:	JungD
Version:	863
System units:	Metric units
Safe LMI:	yes
Supported LMI build(s):	1122
Description:	Telescopic crane / single tele cylinder

❷ Define crane kinematics

- Crane geometry: boom, telescope cylinders and jibs
- Static representation of crane, indicating weights and positions
- Telescoping sequence (synchronous/ asynchronous)

Sx Configurator
Customer-specific parametrization

3 Insertion of load charts

- Copy and insert customer-specific load charts
- Support for multidimensional load charts
- 3D view of load charts
- Configure crane behavior at values above and below those in the charts
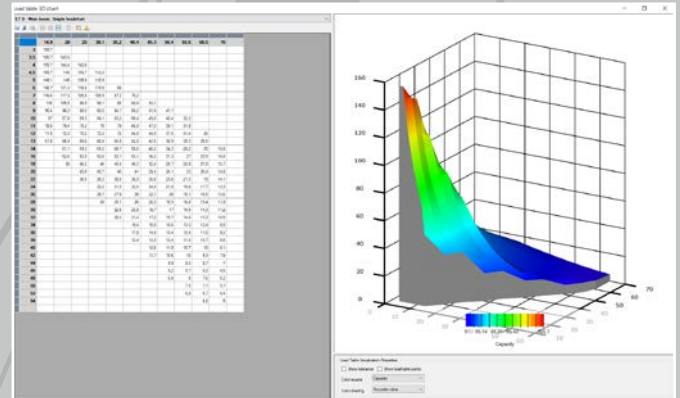
4 Entry of operating modes

- Definition of operating modes
- Referencing of load charts to operating modes
- Load charts switchable in response to variables and conditions (rotary angle, digital inputs, telescoping sequences, work ranges, counterweights etc.)

5 Limitations and actions

**The following actions can be performed within a load chart:**

- Parametrization of limit value monitoring for any defined variables (radiuses, angles, lengths, heights, weights, forces etc.)
- Relational operators: larger than (>), larger than or equal to (≥), smaller than (<), smaller than or equal to (≤)
- Automatic parametrization of standardized load charts
- Selectable actions:
  - Complete stop
  - Switch off individual movements
  - Generate or output error messages, warnings or preliminary warnings

6 Inter-process communication

- Interface to customer-specific application program
- Definition of interface variables of the application program
- Definition of variables for further handling in downstream processes
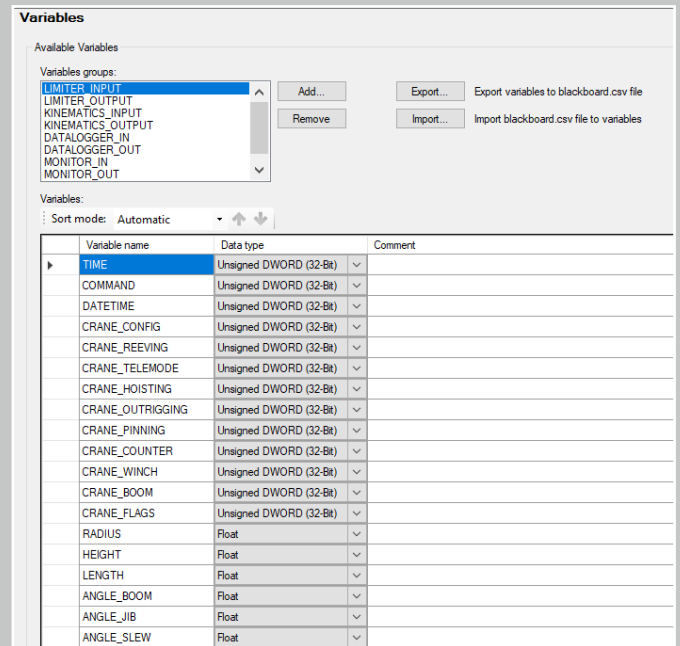
7 Calibration

- Definition of customer-specific guided crane calibration
- Flexible editing of instructions
- Simulation of RCL calculations

Calibration possibilities in the Sx Configurator

- Guided calibration by groups and individual steps
- Expert calibration (visualization and analysis of all calibration measurements)
- Offline calibration and data analysis
- Automatic recording and documentation of the entire calibration process
- Online link to the controller
- Maximum accuracy achievable via verification steps
- Overview of achieved RCL accuracy for approval and release processes
- Visualization of accuracy using traffic light system
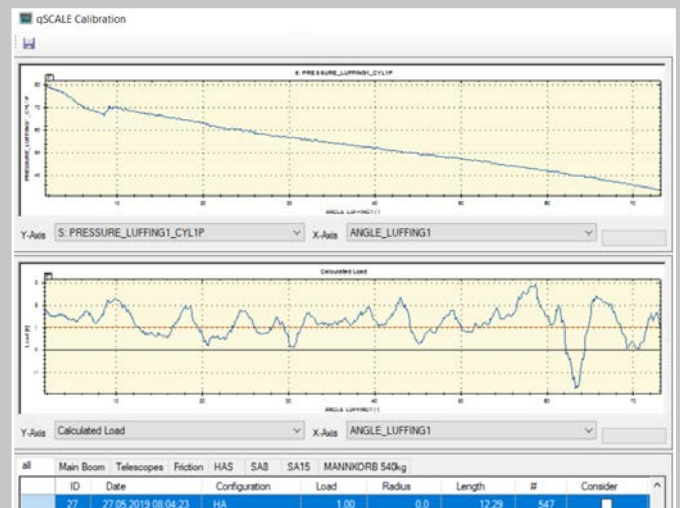
↗ Additional services with the xSCALE Tool Launcher

The Sx Configurator also provides a dynamic interface for functional add-ons.

- Change time and date
- Read out system events of the controller
- See overview of available software
- Change IP address
- Show version
- Directly upload or download complete project data or subsets
- Download recordings from data logger
- Generate scripts for USB sticks for autonomous use with the cSCALE product family

trueSafety
Tested safety for reliable applications

Safety features for compliance with ISO 13849

When programming safety-relevant software, we give high priority to preventing errors. ISO 13849 defines very specific requirements for us as a manufacturer and you as a user. They include performing functional tests.

While developing the qSCALE RCL trueSafety software library, we took into account all of the **requirements for ensuring the functional safety of programmable electronic systems.** We also complied with the corresponding safety standards.

The result: Every implemented safety function fully meets the requirements of the 2006/42/EC machinery directive.

The development process (V model) and programming work were fully compliant with the specifications of SIL 2 of EN 62061 and EN 61508-3.

Your benefit: you can implement control programs up to level PL d.

↗ The results have been certified under the following laws and standards:

Law: Directive 2006/42/EC

Standards:
- EN ISO 13849
- EN IEC 62061:2016
- EN IEC 61508:2010
- EN 13000:2014

EG-Baumusterprüfbescheinigung
Certificate of EC type examination
Nr.: TÜV-A-MHF/MG19-00326
gemäß Richtlinie 2006/42/EG (Maschinen)
according to the Directive 2006/42/EC (Machinery)

TÜV AUSTRIA

Auftraggeber: WIKA Mobile Control GmbH & Co.KG
Applicant: Hertzstr. 32 - 34
76275 Ettlingen
Deutschland / Germany

Hersteller: siehe Auftraggeber
Manufacturer: see applicant

Produkt: ‚LMB-C Bibliothek für Teleskopkrane'
Product: ‚RCL-C Libraries for telescopic cranes'

Zubehör: Gemäß Anhang
Accessories: According to annex

Typ: Logikeinheiten für Sicherheitsfunktionen
Type: Logic units to ensure safety functions

Beschreibung: Softwaremodule für LMB Berechnungen bei Teleskopkranen
Description: Software modules for RCL calculation of telescopic cranes

Prüfgrundlagen: Richtlinie 2006/42/EG idgF. und Normen: EN ISO 13849, EN / IEC 62061
Tested according to: Directive 2006/42/EC in current version and standards EN ISO 13849, EN / IEC 62061 (Anwendung gemäß Risikobeurteilung / application according to risk assessment)

Bemerkungen: Gemäß Anhang
Remarks: According to annex

Hiermit bestätigt die TÜV AUSTRIA SERVICES GMBH als Benannte Stelle (ID-Nr. 0408), dass das oben angeführte Produkt den grundlegenden Sicherheits-Anforderungen der Richtlinie 2006/42/EG entspricht. Grundlage dieser Bescheinigung ist das zur Prüfung vorgelegte Prüfmuster und die technische Dokumentation.
Gemäß Artikel 5 und Anhang III ist am Produkt die CE-Kennzeichnung vorgesehen.
Hereby TÜV AUSTRIA SERVICES GMBH certifies as Notified Body (ID-No 0408), that the above mentioned product meets the essential safety requirements of the Directive 2006/42/EC. The certificate is based on the test specimen and the technical documentation subjected to the test.
According to Article 5 and annex III the CE mark is foreseen to be affixed on the product.

Prüfbericht: 19-00302_MFO_WIKA_LMB_PB
Test report: 19-00302_MFO_WIKA_LMB_PB

06.12.2019
Datum
Date

Dipl.-Ing. (FH) Matthias Forkl
Benannte Stelle 0408
Notified Body 0408

30.11.2024
Gültig bis
Valid till

Auszugsweise Vervielfältigung nur mit Genehmigung der TÜV AUSTRIA SERVICES GMBH gestattet.
Duplication of this document in parts is subject to the approval by TÜV AUSTRIA SERVICES GMBH.

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Revision 02 vom 12.01.2017
19-00326 MFO WIKA_LMB BB.docx

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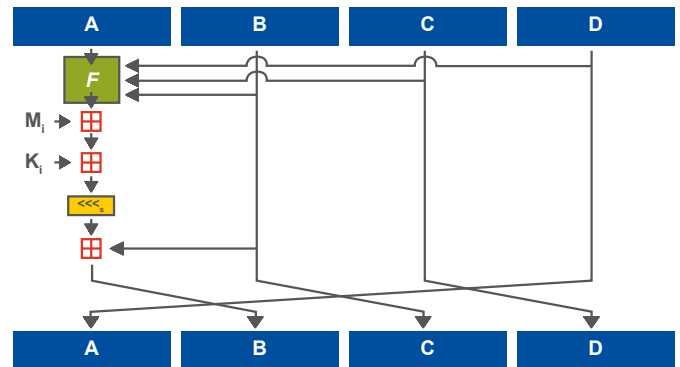
037467-18-4

Fault Recognition and Protective Measures

Safety mechanisms and tests

- Better safe than sorry! Which is why we don't just calculate; we also double-check the results. You can count on it. All safety-relevant programs and data are protected by checksums, and data consistency is also ensured.

- All calculations run redundantly and are monitored with checksums.
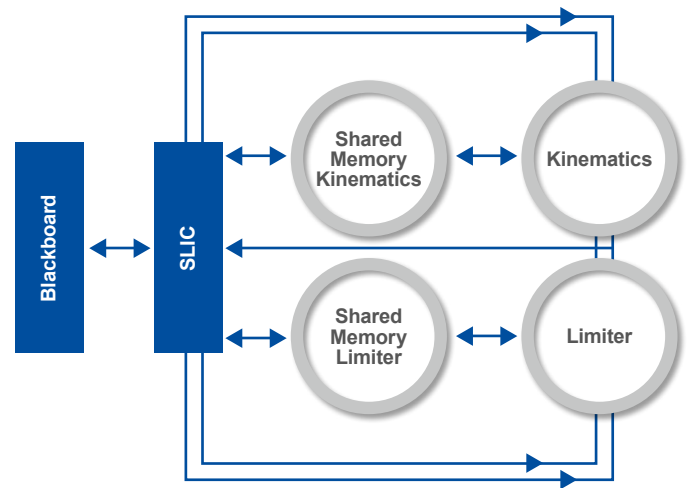
- All safety-relevant processes are cyclically monitored by the qSCALE Safety system using a timeout watchdog.

  Watchdog

  STOP

  Unless feedback is received within a defined time period: **Shutdown**
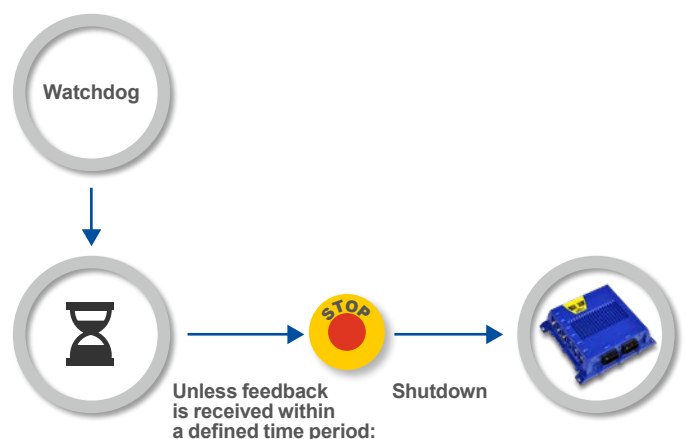
- Security-relevant program versions monitored for compatibility

- RCL self-testing: prior to each change of configuration, correct execution of the RCL is checked using parametrizable customer-specific input and output values/ data.

CODESYS Module Library

For modular use of tested functions

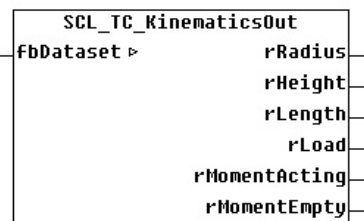The CODESYS module library is implemented in compliance with the cSCALE programming guidelines for safety-related applications and continually developed further to meet emerging new requirements.

Its modular approach makes it quick and straightforward to program tailored applications for customer-specific requirements.

Your benefit: high flexibility with minimal effort.

↗ The library includes modules for the following functions:

- Analog I/O
- Digital I/O
- Signal processing
- RCL linking
- Parameter and data processing
- Event and file handling
- Data logger
- CANopen/ CANopen Safety communications
- Version management
- Type conversions

```
        SCL_TC_KinematicsOut
─│fbDataset ▷              rRadius├─
                           rHeight├─
                           rLength├─
                             rLoad├─
                     rMomentActing├─
                      rMomentEmpty├─
```

Data Logger

Data recording while the RCL is running

- Parametrizable data and event logger (for recording events and time intervals) to meet customer-specific requirements
- Capture of measurement data in real time
- Customer-specific parametrizable data and event logger (events and time intervals)
- Measurement data capture in real time
- Storage of captured data
- Data is stored in a fixed-sized circular buffer; when its capacity is exhausted, older entries are overwritten with new data.
- The size of the circular buffer is parametrizable.
- The number and size of data entries can be flexibly parametrized depending on customer needs (dependent on the available storage space).
- Raw data is automatically converted into standard Excel format for further processing.

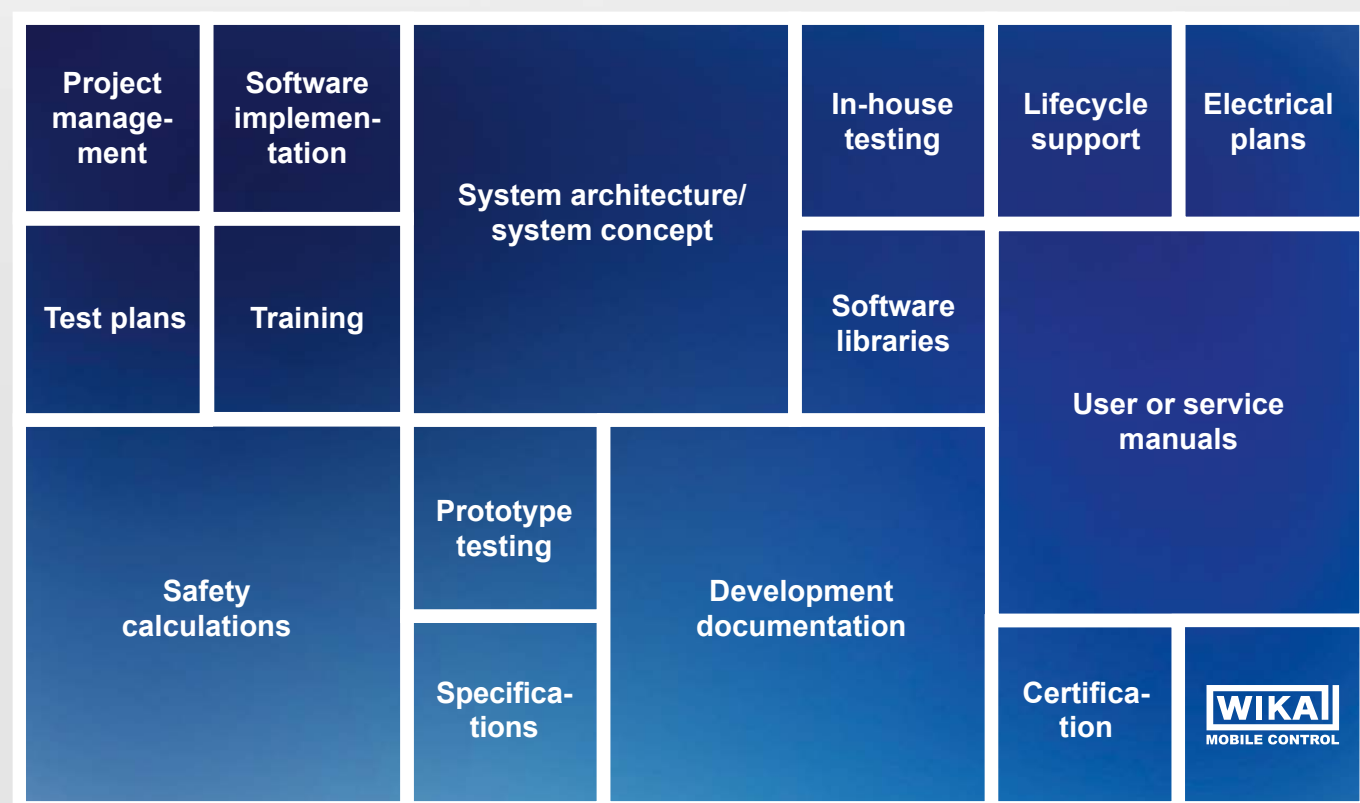| qSCALE - DATALOGGER REPORT	
Manufacturer:	Customer
Project Number:	ProjectNumber
Machine Variant Id:	0
Serial Number:	4294967295
Commisioning User Id:	4294967295
Commisioning Revision:	1
Commisioning Date:	22.08.2012
Start Report:	26.02.2020
End Report:	26.02.2020
Startup Count:	3
Operation Hours:	929,666
Movement Hours:	313,698
Load Hours:	117,092
Load Counter 25..50%	337
Load Counter 50..75%	128
Load Counter 75..90%	53
Load Counter 90..100%	25
Load Counter 100..110%	22
Load Counter 110..120%	8
Load Counter >120%	1652
Warning Count:	1352
Cut Count:	1324
Setup Count:	0

We help you meet your requirements!

Take advantage of our expertise

Do you need support? We're available to help you with tailored approaches for every experience level. You can choose comprehensive Premium Support during the entire lifetime of your series, only qSCALE training at the start of your project, or anything in between.

We always keep our shared goal in sight: to make your application fit for a safe future!

Flexibly choose the services you require from our modular range:

- Project management
- Software implementation
- System architecture/system concept
- In-house testing
- Lifecycle support
- Electrical plans
- Test plans
- Training
- Software libraries
- User or service manuals
- Safety calculations
- Prototype testing
- Development documentation
- Specifications
- Certification

WIKA
MOBILE CONTROL

Worldwide

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We make lifting loads safer!

Drawing on many years of experience, we design and produce dependable safety solutions for lifting heavy loads. As a leading specialist in this field, we define innovative standards for enabling reliable communication between machines and their operators in harsh environments.

We develop and integrate application software, mobile controllers and robust sensors that maximize your safety and the availability of your mobile machines.

In our role as system integrator, we also guide you through all project phases: from analysis and concept evaluation across system design and project planning to prototype testing and launch under field conditions. Our safety experts also support certification processes and are available to provide assistance across all phases of lifecycle management.