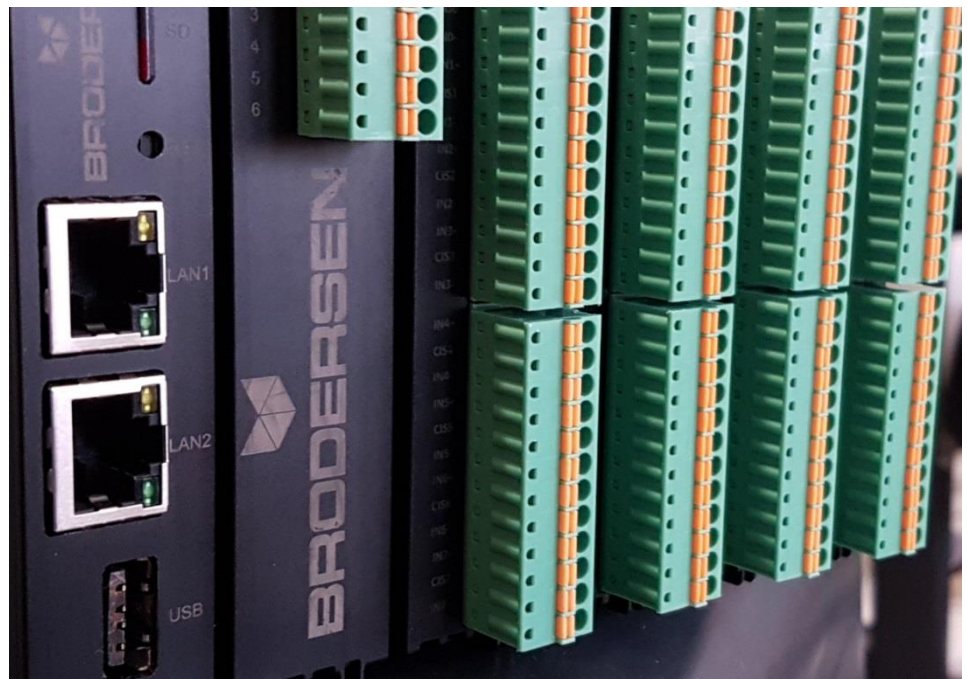


RTU32M Data Sheet

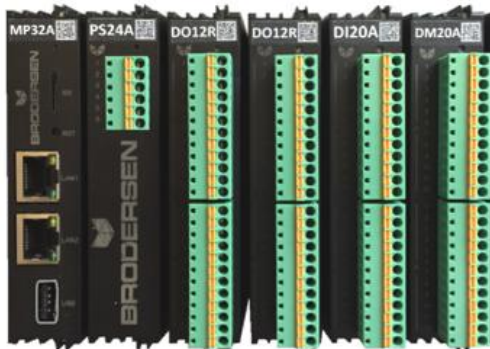
Brodersen Modular RTU

Data Sheet
November 2018





INTRODUCTION TO RTU32M



Brodersen Modular RTU32M Series with advanced RTU/PLC functionality.

The RTU32M series is based on an embedded 32-bit industrial platform providing flexible RTU functionality for a wide range of remote monitoring and control applications in the utility and infrastructure markets.

Each RTU32M comprises of a CPU module, power supply module and the desired mix of IO modules and system modules, as required.

The RTU32M supports a variety of standard and open protocols such as Modbus, IEC60870, IEC61850 and DNP3. It also includes the fast event based Binding protocol - a fast and reliable way to distribute time stamped event data between any Brodersen RTU32M in the network.

The RTU32M has a web server configuration interface for setup of the RTU 'personality' eg. IP address, IO range, Slave address etc. Additional RTU functionality, including logic, messaging and logging are configured in the Brodersen WorkSuite.

Each module is housed in a robust plastic enclosure suitable for DIN rail mounting. The RTU32M modules are 110mmH, 25mmW and 110mmD.

The RTU32M power supply module operates from 10-30VDC.

The RTU32M local IO bus supports up to 250 I/O modules.



FEATURE LIST

- Modular RTU with or without integrated I/O and communication device.
- Reliable Real Time Operating System.
- Communication Protocols Supported;
 - Full Modbus suite.
 - IEC60870-5-101/103/104
 - IEC61850 Client / Server Protocol.
 - DNP3 Master and DNP3 Slave.
 - Binding - Global Distribution and Subscription of Event Based Time Stamped Variables.
- Communication Protocols can also be created as part of the logic application interface.
- Communication interfaces; 2 x Ethernet 10/100, 1x USB are featured on the CPU module.
- Full EN/IEC61131 PLC runtime – also used for special and flexible data manipulation.
- Includes power supply monitoring of the RTU32M supply voltage and temperature
- Support for redundant power supplies
- Hot swappable IO.
- Full remote management with configuration, programming and flexible distribution of all levels of software from and to RTUs on remote locations.



MP32A CPU – Controller Module

The CPU module speed is managed via the RTU performance license options:

MP32A	200MHz
Upgrade options:	528MHz
	900MHz

The default RAM size is 128MB, a license option allows 256MB for 528/900MHz models

HARDWARE - BASICS

CPU: ARM Cortex – A7
Freescale i.MX6UL, 200-900 MHz
Linux: Yocto

Memory: RAM: 128-256MB SDRAM
NAND Flash: 128MB
NVRAM/FRAM: 128KB

Option: Micro SD Card Flash disc – removable

RTC: Integrated and battery backed
RealTimeClock with 1 msec resolution

Interfaces: LAN: 2x 10/100Mbps RJ45

1 x USB 2.0 Host.

1x USB OTG Micro-B for maintenance and diagnostics.

RTU32M PLC RUNTIME

PLC Runtime performance:

Minimum cycle time: 1msec
Typical cycle time: 2-3msec

Maximum PLC variables: 2 x 20kb – calculated as sum of all variables.

Scan time internal I/O: Min. 2msec



PS24A Power Supply Module

Connector

1x 6 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for supply input.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301:

- Pin 1: Earth
- Pin 2: Earth
- Pin 3: + Vin
- Pin 4: + Vin
- Pin 5: - Vin
- Pin 6: - Vin

Module Input Power

Input supply voltage:

10..30 VDC (Vin)

Power consumption:

Max 2 A @ 12V input voltage.

Max 1 A @ 24V input voltage.

Isolation:

1500 VDC input supply voltage to electronics, 1 minute.

Module Output Supply

Output voltage:

12 VDC +- 10% for I/O modules and electronics.

Output current:

Max 1.2 A continuous for I/O modules.

Max 1.7 A overload current limit / short circuit protection.

In case of an overload / short, I/O module power will turn off and retry after approx. 5 sec.

Module input and output voltage and current, are monitored by the CPU, and reported to the RTU at regular intervals.

Power Supply Redundancy

Two (or more) PSU can be inserted next to each other, to provide PSU redundancy. The two PSUs will do simple load sharing.

If the total load is 100%, one PSU will deliver eg. 60%, and the second 40%.

Note: This is for redundancy only. If more than 100% (1.2 A) is needed, a new PSU segment is needed.

Ambient temperature range:

-40°C to +55°C @ 100% load

-40°C to +70°C @ 50% load



AI08A

8ch Analog Input Module

This module provides 8x user configurable 16bit analog input channels.

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connectors for IO terminations. One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1:	CH0 V-
Pin 2:	CH0 I
Pin 3:	CH0 V+
Pin 4:	CH1 V-
Pin 5:	CH1 I
Pin 6:	CH1 V+
Pin 7:	CH2 V-
Pin 8:	CH2 I
Pin 9:	CH2 V+
Pin 10:	CH3 V-
Pin 11:	CH3 I
Pin 12:	CH3 V+

Connector J401 (lower):

Pin 1:	CH4 V-
Pin 2:	CH4 I
Pin 3:	CH4 V+
Pin 4:	CH5 V-
Pin 5:	CH5 I
Pin 6:	CH5 V+
Pin 7:	CH6 V-
Pin 8:	CH6 I
Pin 9:	CH6 V+
Pin 10:	CH7 V-
Pin 11:	CH7 I
Pin 12:	CH7 V+

Module power supply:

Supply voltage: 12 VDC +/- 20 %

Power consumption: 80mA @ 12V.

Specification:

8 channels (differential configurable analog inputs), with 16 bit resolution is provided. Each channel can measure voltage or current.

Input ranges:

Voltage mode:	0 to 10V, 0 to 5V, -5V to +5V, -10V to +10V
Current mode:	0 to 20mA, -20mA to +20mA, 4mA to 20mA

Input impedance:

Voltage mode:	More than 1M Ω
Current mode:	125 Ohm \pm 0.1%

Effective resolution:	16 bit
ADC resolution:	24 bit
Update time:	30ms (for all channels)
Accuracy (at 25°C):	\pm 0.1%
Nonlinearity:	\pm 0.001%
Temperature drift:	\pm 25ppm/°C
Common mode voltage:	Max. \pm 80V DC
CMRR:	Min. 80dB

Isolation:

Input to digital:	At least 1KV
Channel to channel:	At least 350V

Power Frequency noise rejection:

Default:	50Hz
Option:	60Hz

Digital Low-pass filter:

User configurable



Ambient Temperature range:

Operating: -20°C to +75°C
Storage: -40°C to +85°C

Absolute maximum ratings*:

Voltage: ±40V DC
Current: ±40mA

* Note: Input signals exceeding the absolute maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.

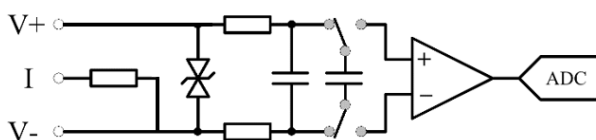
AI CIRCUIT CONFIGURATION

Configuration of each input channel

Input range selection: web configuration
Digital filter configuring: web configuration

Connect V+ and I when using mA input

Input block diagram





AO02A

2ch Analog Output Module

This module provides 2x user configurable 16bit analog output channels.

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connectors for IO terminations. One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector J301 (upper):

Pin 1:	CH 0 Vout
Pin 2:	CH 0 common
Pin 3:	CH 0 Iout
Pin 4..6	Not used
Pin 7:	CH 1 Vout
Pin 8:	CH 1 common
Pin 9:	CH 1 Iout
Pin 10..12	Not used

Connector J401 (lower):

Pin 1..12	Not used.
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Specification:

2 channels of sourced, configurable analog output with 16 bit resolution are provided. Each channel has voltage or current output (only one output type for each channel is selectable/active at a time). There is isolation between the analog output and other channels.

Electrical characteristics

Output ranges:

Voltage mode: 0 to 10V,
0 to 5V,
-5V to +5V,
-10V to +10V

Current mode: 0 to 20mA,
4mA to 20mA

Output load for voltage mode:

Max load current: 10mA
Short circuit current: 20mA (typ.)

Output load for current mode:

Max load impedance: 1K Ω
Open circuit detection: Yes

Resolution: 16 bit
Accuracy (at 25°C): $\pm 0.1\%$
Nonlinearity: $\pm 0.02\%$
Temperature drift: $\pm 25\text{ppm}/^\circ\text{C}$

Isolation:

Output to digital: At least 1KV
Channel to channel: At least 1KV

Ambient Temperature range:

Operating: -20°C to $+75^\circ\text{C}$
Storage: -40°C to $+85^\circ\text{C}$

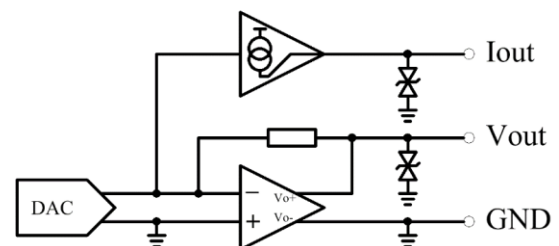
AO CIRCUIT CONFIGURATION

Configuration of AO channel

Only one of the 'Iout' or 'Vout' terminals must be used, according to desired output type (current or voltage).

The range of output is configured through web-based configurator and/or WorkSuite configuration. Details are provided in RTU User Guides.

Output block diagram



Module Power Requirements:

Power consumption: 200mA @ 12V.



DI20A, DI20B 20ch Digital Input Module

This module provides 20x digital input channels (10-30VDC or 30-60VDC).

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1: Common section A
Pin 2..11 Digital input 0 to 9 section A
Pin 12: Common section A

Connector J401 (lower):

Pin 1: Common section B
Pin 2..11 Digital input 10 to 19 section B
Pin 12: Common section B

Specification:

20x bipolar optical isolated digital inputs for 12..24 or 48 VDC are provided. They are arranged in 2x sections of 10x inputs with 2 common terminals.

All Inputs provide software counters, with up to 100 Hz counting frequency @ 50% duty.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage A: Activated 10 - 30 VDC
Deactivated Max 3 VDC.

Input current A: Typical 3 mA @ 12 V,
Typical 6 mA @ 24 V

Input voltage B: Activated 30 - 60 VDC
Deactivated Max 8 VDC.

Input current B: Typical 4 mA @ 48 V

Input delay: 100 μ s typical.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:
Power consumption: 25mA @ 12V.



DI12H 12ch Digital Input Module

This module provides 12x digital input channels (90-140VDC) with ch-ch isolation.

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1: Common section A
Pin 2..11 Digital input 0 to 5 section A
Pin 12: Common section A

Connector J401 (lower):

Pin 1: Common section B
Pin 2..11 Digital input 6 to 11 section B
Pin 12: Common section B

Specification:

12x bipolar optical isolated digital inputs for 90-140 VDC are provided. They are arranged in 2x sections of 6x inputs with 2 terminals per channel.

All Inputs provide software counters, with up to 100 Hz counting frequency @ 50% duty.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage: Activated 90 - 140 VDC
Deactivated Max 25 VDC.

Input current: Typical 3 mA @ 110 VDC

Input delay: 100 μ s typical.

Isolation:
2000 VAC input to electronics, 1 minute.

Module Power Requirements:

Power consumption: 30mA @ 12V.



DI20C

20ch Digital/Counter Input Module

This module provides 18x digital input channels (10-30VDC) and 2x 5kHz (5-30VDC) counters. Counters can also be DI.

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1: Common section A
Pin 2..9 Digital input 0 to 7 section A
Pin 10..11 Counter input 8 to 9 section A
Pin 12: Common section A

Connector J401 (lower):

Pin 1: Common section B
Pin 2..11 Digital input 10 to 19 section B
Pin 12: Common section B

Specification:

18x bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in 2x sections of 10x inputs with 2 common terminals.

Inputs 0.. 7, 10-19 provide software counters, with up to 100 Hz counting frequency @ 50% duty.

2x counters (inputs 8 and 9) provide high speed hardware counters, with up to 5 KHz counting frequency @ 50% duty (5-30VDC operation).

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

This could also be used in combination with software counters, in case a low frequency mechanical contact is used for counters.

Debounce filter setting has no effect on high speed counters.

DI Input voltage:

Input 0..7 Activated 10 - 30 VDC.
Deactivated Max 3 VDC.

Input 10..19 Activated 10 - 30 VDC.
Deactivated Max 3 VDC.

Input 8..9 Activated 5 - 30 VDC.
Deactivated Max 2 VDC.

DI Input current:

Input 0-7/10-19 typical 2.5 mA @ 12 V
Input 0/10-19 typical 5 mA @ 24 V
Input 8-8 typical 4 mA @ 12 V
Input 8-9 typical 8 mA @ 24 V

DI Input delay:

100 μ s typical.

High speed counters (inputs 8 and9):

Maximum frequency, 5KHz @ 10..30VDC input.

Isolation:

2000 VAC input to electronics, 1 minute.

Module Power Requirements:

Power consumption: 25mA @ 12V.



DO12R 12ch Relay Output Module

This module provides 12x relay output channels (N.O. contact pairs).

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for relay outputs.

One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector J301:

Pin 1..2: Relay output 0 contact, NO.
Pin 3..4: Relay output 1 contact, NO.
Pin 5..6: Relay output 2 contact, NO.
Pin 7..8: Relay output 3 contact, NO.
Pin 9..10: Relay output 4 contact, NO.
Pin 10..11: Relay output 5 contact, NO.

Connector J401:

Pin 1..2: Relay output 6 contact, NO.
Pin 3..4: Relay output 7 contact, NO.
Pin 5..6: Relay output 8 contact, NO.
Pin 7..8: Relay output 9 contact, NO.
Pin 9..10: Relay output 10 contact, NO.
Pin 10..11: Relay output 11 contact, NO.

Specification:

12x mechanical non latching relay outputs, SPST, are provided.

Relay output: potential free contact SPST (NO).

Load voltage:

Max 240 VAC, 125 VDC.

Load current resistive:

1 A @ 240VAC,
0.25A @ 125VDC, 2A @ 30VDC.

Output delay:

typical 5 mS.

Isolation:

2000 VAC output to electronics, 1 minute.

Ambient temperature range:

-25°C to +70°C

Module Power Requirements:

25mA @ 12V plus 10mA for each activated relay output.



DO20A

20ch Digital Output Module

This module provides 20x digital output channels (smart high side switch, 10..30 VDC).

Connectors

2x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Output terminals layout are as follows:

Connector J301 (upper):

Pin 1: Vin + section A
Pin 2..11 Digital output 0 to 9 section A
Pin 12: Vin - section A

Connector J401 (lower):

Pin 1: Vin + section B
Pin 2..11 Digital output 10 to 19 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:

Power consumption: 30mA @ 12V.

Digital Outputs.

20 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in two sections of 10 outputs. The sections are isolated from each other and electronics.

External feed voltage: 10 – 30 VDC

Output current: Max 0.5A, max 2A per section (10 outputs)

Output delay: 1ms (max.)

On resistance: 160mΩ (typ.)

Output leakage current: 7µA (max. in off state)



DM20A

Combination 10ch DI + 10ch DO

This module provides 10x digital input channels (10-30VDC) and 10x digital output channels (smart high side switch, 10..30 VDC).

Connectors

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs.

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1: Common section A
Pin 2..11 Digital input 0 to 9 section A
Pin 12: Common section A

Connector J401 (lower):

Pin 1: Vin + section B
Pin 2..11 Digital output 0 to 9 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:

Power consumption: 30mA @ 12V.

Digital Inputs

10 bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in two sections of 10 inputs, with 2 common terminals a section. Each section is isolated from each other and electronics.

Input 0.. 7 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

Input voltage: Activated 10 - 30 VDC
Deactivated Max 3 VDC.

Input current: Typical 3 mA @ 12 V,
Typical 6 mA @ 24 V

Input delay: 100 µs typical.

Digital Outputs

10 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in one section of 10 outputs. The section is isolated from each other and electronics.

External feed voltage: 10 – 30 VDC

Output current: Max 0.5A, max 2A per section (10 outputs)

Output delay: 1ms (max.)

On resistance: 160mΩ (typ.)

Output leakage current: 7µA (max. in off state)



DM20C

Comb. 8ch DI + 2ch Ctr + 10ch DO

This module provides 8x digital input channels (10-30VDC), 2x 5kHz (5-30VDC) counters and 10x digital output channels (smart high side switch, 10..30 VDC). Counters can also be DI.

Connectors

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital Inputs/Counters.

1x 12 way 3.5mm Anytek (Phoenix MC) pluggable spring clamp connector for Digital outputs.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector J301 (upper):

Pin 1: Common section A
Pin 2..9 Digital input 0 to 7 section A
Pin 10..11 Counter input 8 to 9 section A
Pin 12: Common section A

Connector J401 (lower):

Pin 1: Vin + section B
Pin 2..11 Digital output 0 to 9 section B
Pin 12: Vin - section B

Ambient temp. range: -25°C to +70°C

Module Power Requirements:

Power consumption: 30mA @ 12V.

Digital Inputs

10 bipolar optical isolated digital inputs for 12..24VDC are provided. They are arranged in two sections of 10 inputs, with 2 common terminals a section. Each section is isolated from each other and electronics.

Input 0.. 7 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle.

A user programmable debounce filter, in 1 ms units, is provided for each digital input, to filter out noise or mechanical relay bounce.

DI Input voltage:

Input 0..7 Activated 10 - 30 VDC.
Deactivated Max 3 VDC.

Input 8..9 Activated 5 - 30 VDC.
Deactivated Max 2 VDC.

DI Input current:

Input 0-7 typical 2.5 mA @ 12 V
Input 0-7 typical 5 mA @ 24 V
Input 8-9 typical 4 mA @ 12 V
Input 8-9 typical 8 mA @ 24 V

Input delay: 100 µs typical.

Digital Output.

10 smart high side switch, optical isolated, digital outputs for 10..30 VDC are provided. They are arranged in one section of 10 outputs. The section is isolated from each other and electronics.

External feed voltage: 10 – 30 VDC

Output current: Max 0.5A, max 2A per section (10 outputs)

Output delay: 1ms (max.)

On resistance: 160mΩ (typ.)

Output leakage current: 7µA (max. in off state)



EMC, Safety and Environmental

EMC: IEC 61000-6-2, IEC 61000-6-4
Safety Requirements: IEC 60950-1

Climatic:

- Damp Heat: IEC 60068-2-30
- Damp Heat Steady: IEC 60086-2-3
- Dry Heat: IEC 60086-2-2

Mechanical:

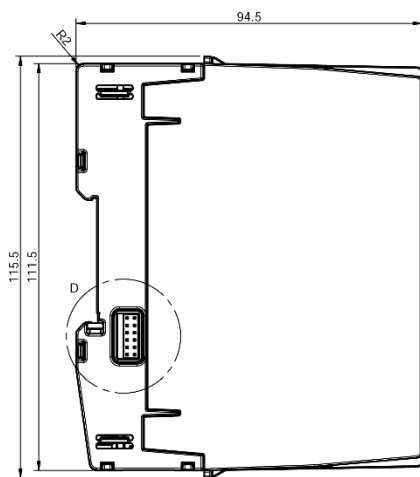
- Vibration: IEC 60255-21-1
- Shock: IEC 60068-2-27
- Shock and Bump Test: IEC 60255-21-2

Maximum frequency, 5KHz @ 10..30VDC input.

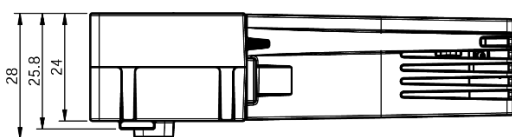
Isolation:

2000 VAC input to electronics, 1 minute.

Module Dimensions



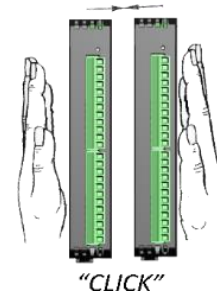
Backplane & I/O module side view



Backplane & I/O module top view

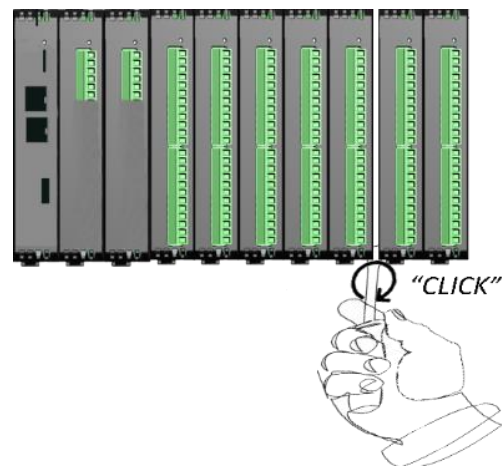
Assembling BUS and I/O modules

Backplane modules are assembled by gently pressing them together with hands, no tools needed.



Separating modules

If two backplane modules need to be separated, use a flathead screwdriver. Push it in between the backplane modules and rotate it gently to allow the modules to be pulled apart.



Further information about the LB2 Series IO modules can be found in the Brodersen LB2 User Manual.