

Brodersen RTU32M Modular RTU IO14A/IO14B Combination IO Card

Data Sheet
November 2019





IO14A / IO14B

Comb. 3 AI + 1 AO + 8 DI + 2 DO

This module provides 3x analog input channels (A has current inputs, B has voltage inputs), 1x analog output channel (current), 8x digital input channels (10-30VDC – includes 2x 5kHz counters and 2x relay output channels. Counters can also be DI.

Connectors

2x 12 way 3.5mm Phoenix MC pluggable screw clamp connector for IO connections.

One dual colour LED on front for module status.

Input terminals layout are as follows:

Connector A (upper):

Pin 1:	DO0 N.O.
Pin 2:	DO0 Common
Pin 3:	DO0 N.C.
Pin 4:	DO1 N.O.
Pin 5:	DO1 Common
Pin 6:	DO1 N.C.
Pin 7:	AI0 +
Pin 8:	AI0 -
Pin 9:	AI1 +
Pin 10:	AI1 -
Pin 11:	AI2 +
Pin 12:	AI2 -

Connector B (lower):

Pin 1:	DI Common
Pin 2.. 9:	DI0 – DI7
Pin 10:	AO0 Vin +
Pin 11:	AO0 Iout
Pin 12:	AO0 Vin -

Ambient temp. range: -25°C to +70°C

Module Power Requirements:

Power consumption: 100mA @ 12V.

Analog Inputs

3 channels (differential analog inputs), with 16 bit resolution is provided. IO14A channels can measure current, IO14B channels can measure voltage.

Module Firmware Version < 1.1.2.1

Type A Current mode: 0/4mA to 20mA

Type B Voltage mode: 0/1to 5V

Module Firmware Version = 1.1.2.2

Type A Current mode: 0/3.5mA to 20.5mA

Type B Voltage mode: 0/0.875 to 5.125V

Module Firmware Version > 1.1.2.4

Type A Current mode: 0/3.5mA to 20/20.5mA

Type B Voltage mode: 0/0.875 to 5/5.125V

Current impedance:	250 Ohm ±0.1%
Voltage impedance:	More than 1MΩ
Effective resolution:	16 bit
ADC resolution:	24 bit
Update time:	10ms (for 3 channels)
Accuracy (at 25°C):	±0.1%
Isolation:	At least 1KV (1 min.)

NOTE: The input range has been extended from standard 4-20mA/1-5V in module firmware version 1.1.2.2 onward. Firmware version 1.1.2.4 allows selection between standard and extended in Worksuite (Worksuite version 1.65.5.1280 and up ONLY).

Analog Output

1 channel of analog output with 16 bit resolution is provided. The channel has a current output but requires 10-30VDC field power for loads > 500 Ohms.

Output range:	0/4 to 20mA
Max load impedance:	1KΩ
Resolution:	16 bit
Accuracy (at 25°C):	±0.1%
Isolation:	At least 1KV



Relay Outputs

2 mechanical non latching relay outputs, SPDT, are provided.

Load voltage:	Max 125 VDC
Load current resistive:	0.25A @ 125VDC, 2A @ 30VDC
Output delay:	5ms (typical)
Output isolation:	2KV (1 minute)

Digital Inputs

8 bipolar optical isolated digital inputs for 12..24VDC are provided. Inputs are isolated from each other and electronics.

Inputs 0.. 5 will provide software counters, with up to 100 Hz counting frequency @ 50% duty cycle. Inputs 6 and 7 will provide high speed hardware counters, with up to 5kHz counting frequency at 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..5 Activated 10 - 30 VDC.
Deactivated Max 3 VDC.

Input 6..7 Activated 5 - 30 VDC.
Deactivated Max 2 VDC.

DI Input current:

Input 0-5	typical 2.5 mA @ 12 V
Input 0-5	typical 5 mA @ 24 V
Input 6-7	typical 4 mA @ 12 V
Input 6-7	typical 8 mA @ 24 V

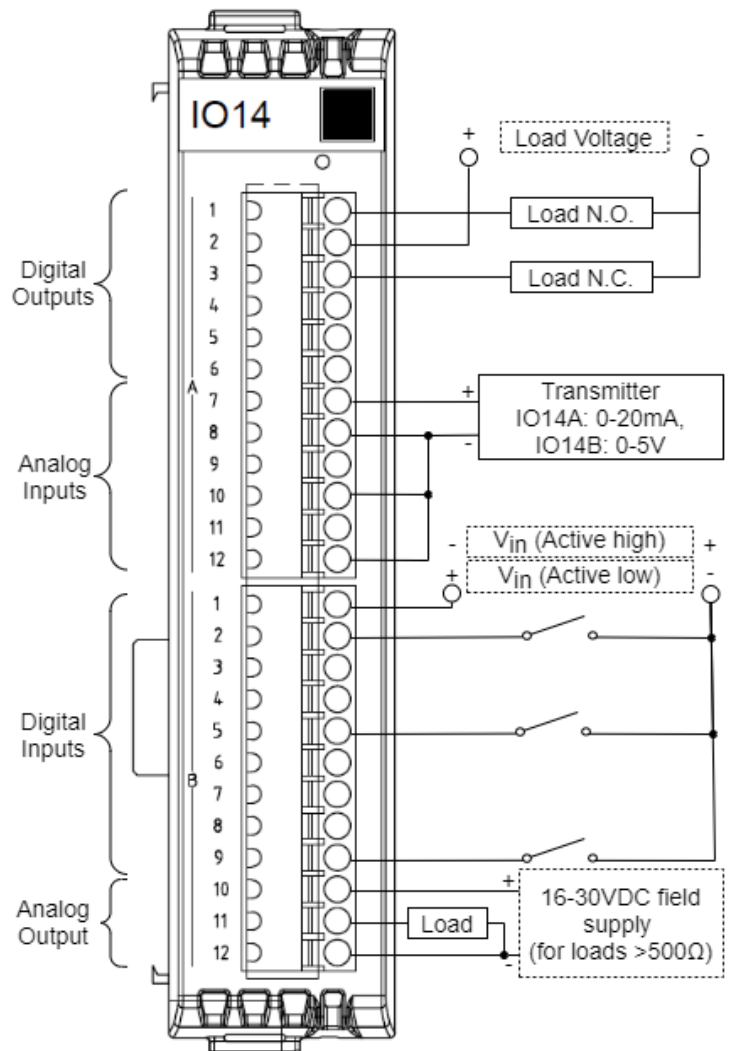
Input delay: 100 μ s typical.
Counters (DI 6-7) Up to 5kHz @10-30VDC
Isolation: 2KV (1 minute)

Absolute maximum ratings*:

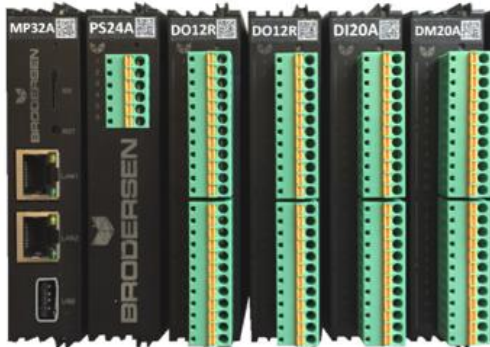
Analog input current (type A): ± 30 mA
Analog input voltage (type B): ± 40 VDC
Analog output power (Vin+): ± 35 VDC
Digital Input voltage: ± 40 VDC

* Note: Exceeding the absolute maximum values **MAY CAUSE PERMANENT DAMAGE** to the module.

Example Wiring Diagram



OVERVIEW OF RTU32M RANGE



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 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 of configuration, programming and flexible distribution of all levels of software from and to RTUs at remote locations.



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:

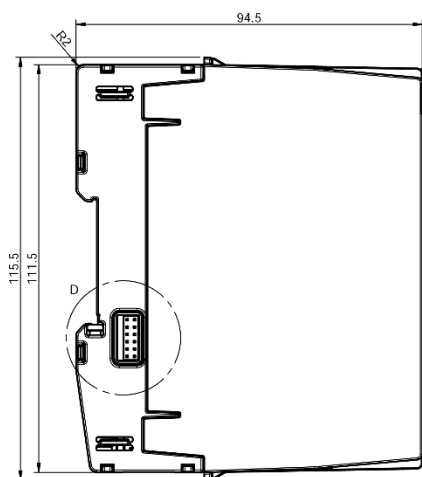
- Vibration: IEC 60255-21-1
- Shock: IEC 60068-2-27
- Shock and Bump Test: IEC 60255-21-2

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

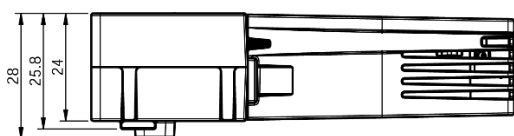
Isolation:

2000 VAC input to electronics, 1 minute.

Module Dimensions



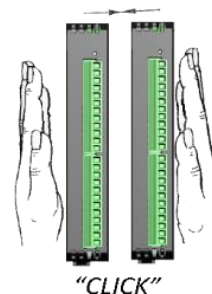
Backplane & I/O module side view



Backplane & I/O module top view

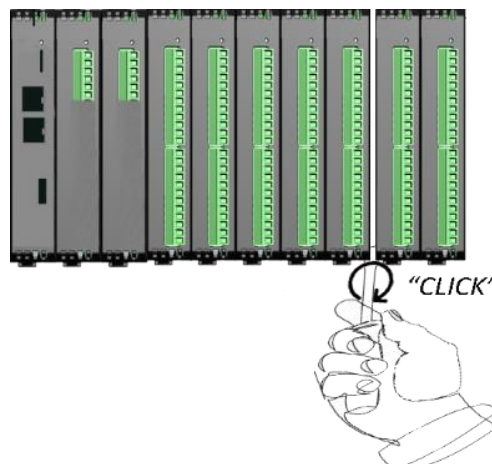
Assembling BUS and I/O modules

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.





Module LED pattern

A two color (red/yellow) LED is provided on each module. This indicates the module status with different blinking patterns. The yellow color indicates the module mode (run, stop). The red color indicates module errors or warnings. Each pattern / color will operate in 2 second duty cycles. When the red LED is inactive (off), only the 2 second yellow duty cycle will operate (yellow is always active). When the red LED is active, a switch between 2 seconds of yellow, and 2 seconds of red patterns will occur.

LED	Pattern
Off	LED is constantly off
On	LED is constantly on
Blinking	LED is flashing, 200 ms on, 200 ms off
Flickering	LED is flashing, 50 ms on, 50 ms off
Single Flash	LED pattern is, 200 ms on, 1800 ms off
Double Flash	LED pattern is, 200 ms on, 200 ms off, 200 ms on, 1400 ms off
Triple Flash	LED pattern is, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 1000 ms off
Quadruple Flash	LED pattern is, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 200 ms off, 200 ms on 600 ms off

Yellow I/O module LED Codes:

Yellow LED	Pattern Description
Off	No module power
On	Module is Operational mode.
Blinking	Module is in Operational Timeout, caused by missing RTU heartbeat "timeout from CPU to I/O module". Outputs will be managed according to failsafe configuration (Last state, forced On, forced Off)
Flickering	NA
Single Flash	No valid node ID. Normal after power up.
Double Flash	Module is assigned a valid node ID, and is Stopped .
Triple Flash	NA
Quadruple Flash	Module is in firmware update mode.

RED I/O module LED Codes:

Red LED	Pattern Description
Off	No warnings or errors.
On	Module LB2 communication error. A number of LB2 communication errors has occurred, which has caused the LB2 error counters to reach the error level. The module will automatically stop any transmission on the bus, to prevent LB2 bus corruption for other modules (nodes). The module will still listen for NMT commands, and a communication reset command will reconfigure module configuration / communication, if the error was temporary.
Blinking	NA
Flickering	Corrupted module information / calibration data in EEPROM. Fatal error
Single Flash	Module communication error warning. A number of LB2 communication errors has occurred, which has caused the LB2 error counters to reach the warning level. A number of successful communications will automatically reset this warning.
Double Flash	NA
Triple Flash	NA
Quadruple Flash	NA