TeleControlNet

Inter Act
industrial automation

Datasheet
IoT controller

Introduction

The IoT controller is a mini sized and low power TeleController in a series of Remote Terminal Units (RTU) that Inter Act has developed for telemetry over internet.

The IoT controller can be connected to a private and secured (remote) SCADA domain in TeleControlNet. TeleControlNet.nl is a Software as a Service (SaaS) for WEBscada applications.

The IoT controller is an integration of a generic computing platform with in- and outputs, and an onboard LoRa radio module for (wireless) data communication.

Main functions

Because of its low power features, it can be used at locations where there is no power supply.
For mobile applications it also has an integrated GPS module onboard and a 3-axis accelerometer to detect shocks or movement.

The IoT controller has onboard digital and analog I/O’s for industrial signals and is specifically designed to perform simple automation tasks. Additionally, it has optional communication interfaces for RS232, RS485, CAN bus.

The IoT controller is supplied as preconfigured product for customer-specific requirements. Also the enclosure can be customer specific.

Wireless long distance communication is provided using LoRaWAN on the 868MHz band (Europe, Southern Africa). LoRaWAN Class A is standard, Class C is optional.

Main features

- Local data storage.
- Controlling and monitoring functions for remote mini processes.
- Real time process alarms to TeleControlNet (real time messages can be forwarded as e-mail or sms).
- Standard enclosure is mountable on a 35 mm DIN rail.
- Cost-efficient solution for small and battery powered IoT applications.

Specifications

Electrical

There are three power options, two external and one internal.

External:

- 6-30V DC/AC (AC not yet validated), this is buffered with a supercap so that power failure can still be reported as an real time alarm, without the need for internal batteries.
  Bias consumption is not yet specified but less than 0,5mA @ 12V DC
- External battery, nominal voltage 3 to 3.6 V.

Internal:

- Two 3.6V AA lithium thionyl chloride (Li-SOCl2), e.g. Saft LS14500.

Environmental

- Operating temperature: -20 °C to 85 °C (-4 °F to 185 °F) (1,2)
- Storage temperature: -40 °C to 85 °C (-40 °F to 185 °F)
- Relative humidity (RH): 10% to 95% (non-condensing)
- Standard enclosure DIN rail mounted (IP20/NEMA1)

Note 1: Operating at high temperatures for prolonged periods will degrade some components faster.
Note 2: Depending on battery chemistry/construction and peak power loads on the IoT-Controller low temperature range is possibly reduced when operating on atteries. Please refer to the manufacturer datasheet.

In- and outputs:

Digital inputs

Number of inputs: 6
The 6 digital inputs are galvanic isolated with an optocoupler with a common ground/power pin. The inputs can also be used for frequency measurement: 1 kHz standard, 10 kHz optional. Maximum voltage 60V AC/DC.

Digital outputs

Number of outputs: 2
The 2 digital outputs are equipped with a solid state relay, galvanically isolated, potential free and protected against overvoltage and overcurrent. Maximum voltage 60V AC/DC, current 500mA (250mA over temperature range).

Analog current inputs

Number of inputs: 4
There are 4 current inputs for the industrial 0-20mA standard. These are potential free up to 40V above system ground. The 4 analog inputs can also be used as a DC digital input.
For this purpose an external series-resistor must be added to limit the current.
Select a suitable resistor to limit the current to e.g. 5 mA using Ohm's law: R = U / 0.005.
To detect 12V the series-resistance should be about 2.4 kOhm, 24V: 4.8 kOhm, etc.

Analog voltage inputs
Number of inputs: 2
The 6 voltage inputs can be used to measure some commonly used sensor voltage ranges: 0-10V, 0-5V and 0-2.5V. The inputs are not galvanic isolated and measure against the system ground.

Connecting external sensors
The IoT controller can provide supply voltage for external low power sensors: 3.3V, 50mA max.

I2C
The external 3.3V I2C bus can be used to connect various sensors and supports wake-up from external interrupt.

Communication port
4 connections are available for additional optional functions, for example: RS232, RS485, CAN bus, additional analog or digital inputs/outputs.

Built-in functions:

Processor
STM32L0 ARM Cortex microcontroller, 32MHz, 192kb Flash, 20kb RAM (Program custom made).

GPS sensor
The 22-channel GPS supports DGPS, SBAS (WAAS/ EGNOS/ MSAS/ GAGAN) and supports both active or passive external antenna’s via a SMA connector. Battery life is prolonged with a low power backup mode while still allowing for fast reaquisition.

3-axis accelerometer
The 3-axis accelerometer features free-fall detection, motion detection (e.g. rotation/tilt), a configurable shock detection for ±2g, ±4g, ±8g or ±16g and measuring acceleration from 1Hz to 5.3kHz.

LoRa radio
The connectivity is provided by LoRa. Via a SMA connector an external antenna can be connected. For applications requiring both LoRa and GPS functions, a combined molest-proof multiband puck antenna which accommodates both the LoRa / Nb-IoT / LTE and the active GPS antenna, can be applied.

In the Netherlands, the IoT controller is supplied with a KPN LoRa subscription, whereby a maximum of 100 messages may be sent per day, and 10 messages in the other direction towards the IoT controller.
A commonly used strategy is to send a status message every X hours. Messages are also automatically sent when a significant change of the inputs occurs. For example for real time alarming. In all cases each message contains the full status of the application.

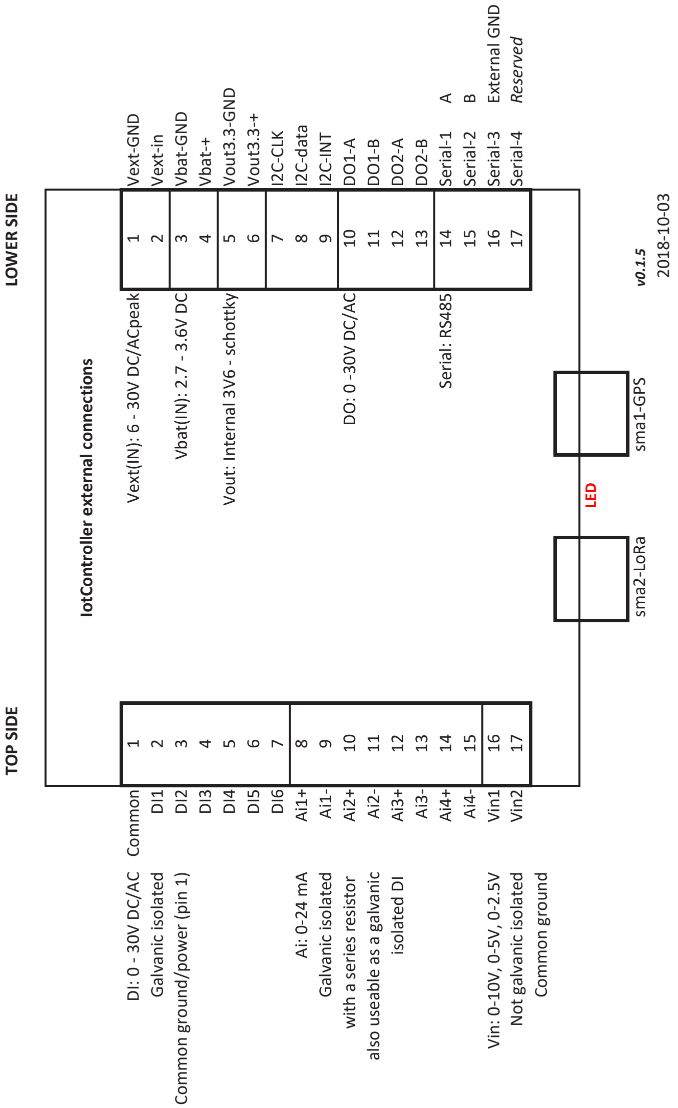
Alternative communication

It is planned to release an Nb-IoT, or LTE IoT variant of the IoT controller in the near future, contact us for more information.

Enclosure

The dimensions of the standard enclosure are 101 x 17.5 x 120 mm (H x W x D) and is DIN-rail mountable.

▶ Technical scheme

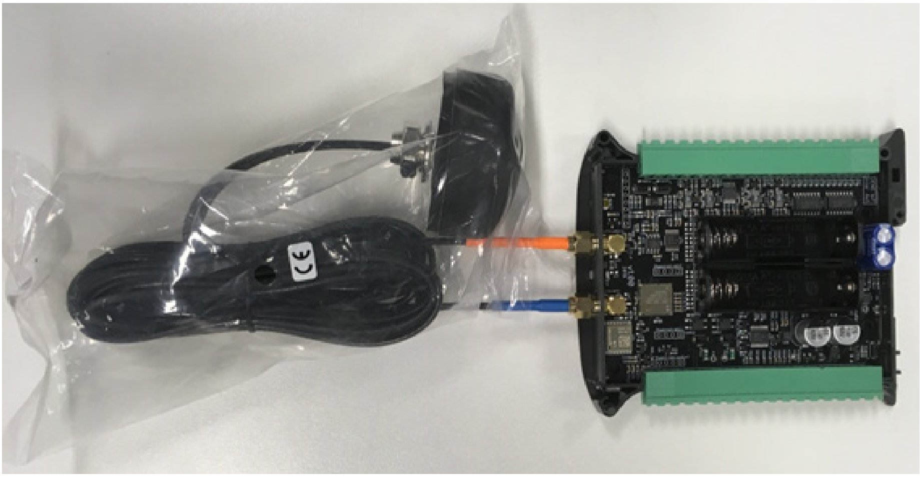


LOWER SIDE

Pin	Name	Note	Description
1	Vext-GND		Vext(IN): 6 - 30V DC/ACpeak
2	Vext-in		
3	Vbat-GND		Vbat(IN): 2.7 - 3.6V DC
4	Vbat-+		
5	Vout3.3-GND		Vout: Internal 3V6 - schottky
6	Vout3.3-+		
7	I2C-CLK		
8	I2C-data		
9	I2C-INT		
10	DO1-A		DO: 0 -30V DC/AC
11	DO1-B		
12	DO2-A		
13	DO2-B		
14	Serial-1	A	Serial: RS485
15	Serial-2	B	
16	Serial-3	External GND	
17	Serial-4	*Reserved*	

TOP SIDE

Pin	Name	Description
1	Common	DI: 0 - 30V DC/AC Galvanic isolated Common ground/power (pin 1)
2	DI1	
3	DI2	
4	DI3	
5	DI4	
6	DI5	
7	DI6	
8	Ai1+	Ai: 0-24 mA Galvanic isolated with a series resistor also useable as a galvanic isolated DI
9	Ai1-	
10	Ai2+	
11	Ai2-	
12	Ai3+	
13	Ai3-	
14	Ai4+	
15	Ai4-	
16	Vin1	Vin: 0-10V, 0-5V, 0-2.5V Not galvanic isolated Common ground
17	Vin2	



Standard shipment including antenna.

▸ Main functions

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