User manual

FIREFLY

ACOWA
INSTRUMENTS

User manual

FIREFLY Alarm unit

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FIREFLY alarm unit

About FIREFLY

FIREFLY is designed as a simple alarm device according to the term "The local red alarm lamp has become intelligent".

FIREFLY is a battery-powered or permanently supplied 3V DC intelligent alarm unit that can replace the existing red alarm lamp, so pump alarms and high-water flow switches are sent directly to the SCADA system via Sigfox communication.

FIREFLY comes with 2 digital inputs and 1 analog input 0-10V DC, which can be used to measure the pump current, as well as provide number of starts and running time if a power coil is connected.

FIREFLY comes with 5 years of Sigfox subscription and batteries - easy to install.

AcowaCore

About AcowaCore

AcowaCore is a data processing program used to collect data from both our SigFox based FireFly and our 4G and SigFox based GEKKO data loggers and convert these data into a standard ModBus protocol. The data can therefore be returned directly to the user's own SCADA system without any other driver configuration required.

What makes AcowaCore unique is the visualization platform AcowaDash. AcowaDash enables a custom interface, which is both intuitive and easily understandable. The individual users can be divided into different levels, so everyone is comfortable using AcowaDash.

SigFox IoT network

About SigFox IoT

Internet of Things (IoT) is a term that refers to a network of dedicated physical objects or “things” that contain embedded technology to communicate and sense its physical environment or interact with its internal components. Over the past few years, IoT has become one of the most talked about new technologies in the world and has seen exponential growth in various industries.

Sigfox is the name of a dedicated global LPWA (Low Power Wide Area) IoT network owned by the French company of the same name. IoT Denmark is Denmark's exclusive Sigfox operator and is responsible for expanding and maintaining the network in Denmark. SigFox Denmark is the leader in the best geographical outdoor coverage with 99.7% coverage nationally.

The Sigfox network works differently than other competing IoT networks by prioritizing costs and network coverage higher than data volume and frequency. This means that the Sigfox network is best suited for situations where many inexpensive devices are needed over a larger area, which does not frequently send messages over the network without requiring maintenance for many years.

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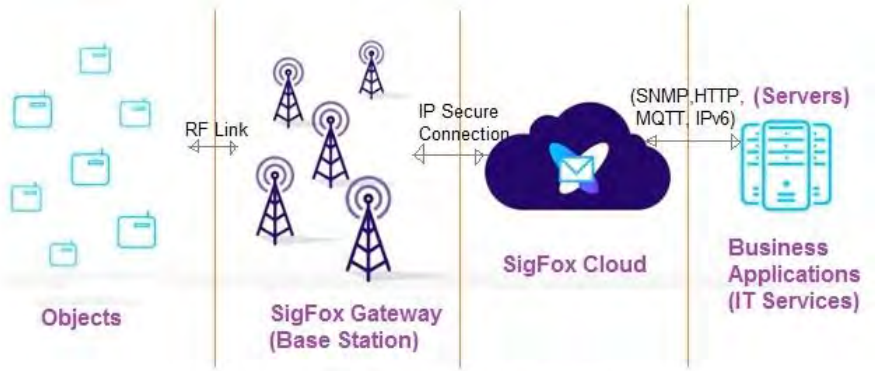

SigFox Network Architecture

The network structure is therefore in place, which allows you to place your FIREFLY and GEKKO data loggers without having to make any further improvements. FIREFLY communicates, using already installed SigFox gateways, to the Sigfox back-end, from which data can be accessed directly via API or equivalent or via ModBus protocol through AcowaCore software.

The coverage of the network may vary from country to country, and it is therefore important to ensure cooperation with the local provider in the individual markets. Information about these can be found at https://www.sigfox.com/en

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Installation

Power supply

FIREFLY must be connected to supply voltage according to the specifications below.

Power supply	2 x Lithium AA batteries or 3-3.6V DC

Psychical specifications

For installation of FIREFLY, the following objectives may be necessary.

Dimensions	104mm
Cable connection	0.5–2,5 mm^2
Free fall drop	30 cm
Enclosure class	IP 67

Installation environments

Humidity	10% - 95% non-condensing
Operation temperature	-20°C til +50°C
Storage temperature	-20°C til +60°C
Maximum operation elevation	Maximum of 2000m above sea level

Build-in power supply

FIREFLY has an internal power supply designed to supply digital input signals. Power supply output + V:

Output voltage	3V DC
Output current	Max 100mA
Tolerance	+ / - 20%

Analog input

FIREFLY is designed with an analog input 0-10V DC.

Numbers of analog inputs	1
Electrically isolated	No
Measuring range	0-10V DC

Digital inputs.

FIREFLY is designed with 2 digital inputs.

Numbers of digital inputs	2
Electrically isolated	No
Digital signal	Low < 5V / < 1mA High > 12V / > 4mA
Cable / signal length	Maximum of 100m

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Operation

Overview

FIREFLY comes with 2 digital inputs and 1 analog input 0-10V DC.

Digital inputs are monitored in real time, and changes are reported instantly through the SigFox network.

For the measurement of analog input. FIREFLY will record the pump's ON / OFF state in a 5-minute resolution on battery and 1-minute resolution on fixed supply, as well as the latest current measured consumption. Both of these parameters require an electrical coil mounted on AI1.

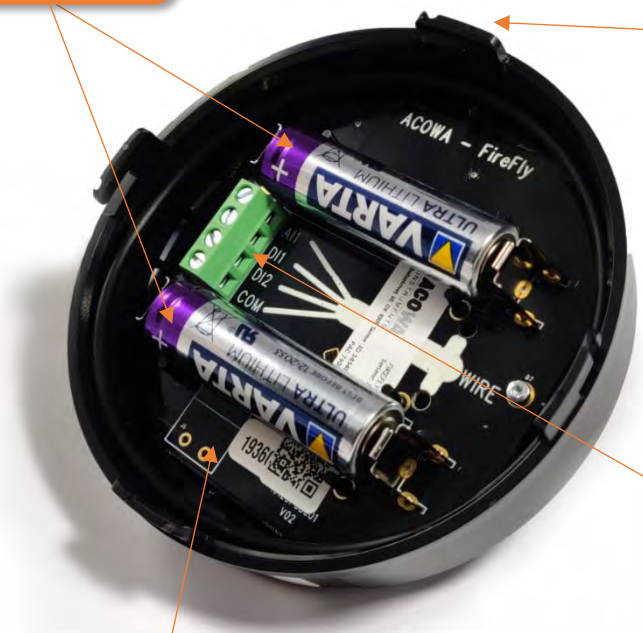
Sealing gasket for sealing between unit and e.g. street cabinet.

M12 gland for cable entry.

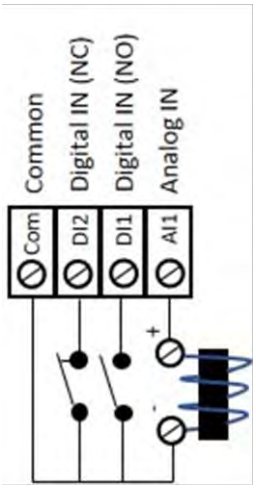
M40 threads and screws for attaching FIREFLY on top eg. street cabinet

Power Supply- Battery.

Locking pouch (4 pieces) for locking FIREFLY upper with lower part.



Clamps for connection.



Power supply- 3-3.6V DC.

Power coil

The power coil used on the analog input must have a voltage range of 0-10V DC with a measuring range of 0-20A. The coil must be able to generate its own voltage corresponding to a minimum of 0.5A during operation.

Telegram structure.

FIREFLY with battery. (5-minute resolution).

Fixtures.

- Operation log telegram every 8 hours with pump data on / off, with a 5-minute resolution.
- Status change on digital inputs in real time, with a delay of 15 minutes at on -> off.
- Status telegram with total counters and latest pump current every 24 hours.
- Status telegram with battery voltage, RSSI (Signal strength) and temperature every 24 hours.

Program

Every 30 seconds, the FIREFLY unit wakes up and scans all inputs for change. If a change has been made, it will be written to FIREFLY memory. Every 5 min. this data is written in the log. This means that FIREFLY on battery has a logging sequence with a resolution of 5 min.

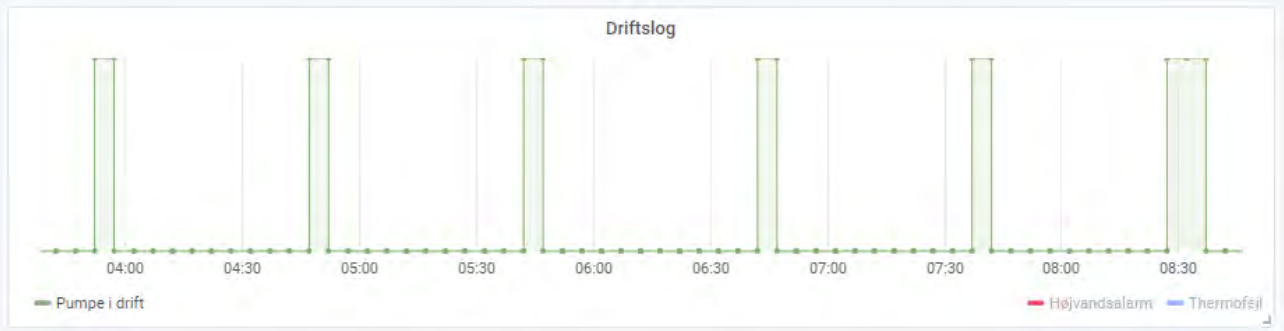
After the scanning is complete, the FIREFLY device goes to sleep again. In hibernation, FIREFLY consumes around 3uA.

Pump operation registration. (30 second scan)
At a measured value of more than 0.5A it is estimated that the pump is running. The current measurement itself is not 100% valid but can be used as a benchmark if something unexpected happens to the power consumption.

Operation log telegram (Every 8 hours)
Every 8 hours, an operation log telegram is sent to the SigFox back end. If the operation log telegram is not received by the SigFox Back end, operating data will be lost for these 8 hours. The operation log telegram contains the status of AI for the past period.

- If high current is detected, then a "1" is registered in the FIREFLY memory. Each bit represents an entire period of 5 minutes.

This means that it is only recorded whether a pump has been running or not, not how long it has been running - nor how many starts it has had, during that 5-minute period. If a pump has an operation time over 2 periods, this will be registered as a registration for 2 periods. (See example from AcowaDash below)



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Registration of change on DI1 and DI2 (30 second scan)
At each scan the status of DI1 and DI2 will be registered. If the status on the DI has changed since the last scan, a status telegram with DI status and last measured current is sent immediately. As the SigFox network has a limitation in the number of telegrams which can be sent per day, a new status change on DI1 and DI2 will have a delay of 15 minutes, before sending a change via SIGFOX backend. This is to ensure that you stay within the allowed number of telegrams sent within 1 hour.

Status telegram (Every 24 hour.)
Every 24 hours, a status telegram containing "total number of starts" and "total time counter" as well as status of DI's and last measured current is sent. In addition, a status telegram containing battery voltage, RSSI (Signal strength) and temperature is sent. (See example from AcowaDash below)

- If there is a change from the last power measurement from "0" -> "1", "total number of starts" is increased by 1.
- If the status is still "1" after the last measurement, "total time counter" is increased by 30 sec.
- Average run time can be calculated from: Total time counter (bit = 30 seconds running time) / Number of total starts. The average driving time will always be calculated from the daily status telegram with a minimum resolution of 24 hours.

FIREFLY with 3V DC supply. (1-minute resolution)

Fixtures.

- Operation log telegram each block with pump data on / off, with a 1-minute resolution.
- Duplicate data in each telegram for greater data quality.
- Status change on digital inputs in real time, with a delay of 15 minutes at on -> off.
- Status telegram with total counters and latest pump flow every 6 hours.
- Status telegram with battery voltage, RSSI (Signal strength) and temperature every 24 hours.

Program

Every 5 seconds, all entries are scanned for changes. If a change has been made, it will be written to FIREFLY memory. Every minute this data is written in a log. This means that FIREFLY on a fixed 3V DC supply has a logging sequence with a resolution of 1 min.

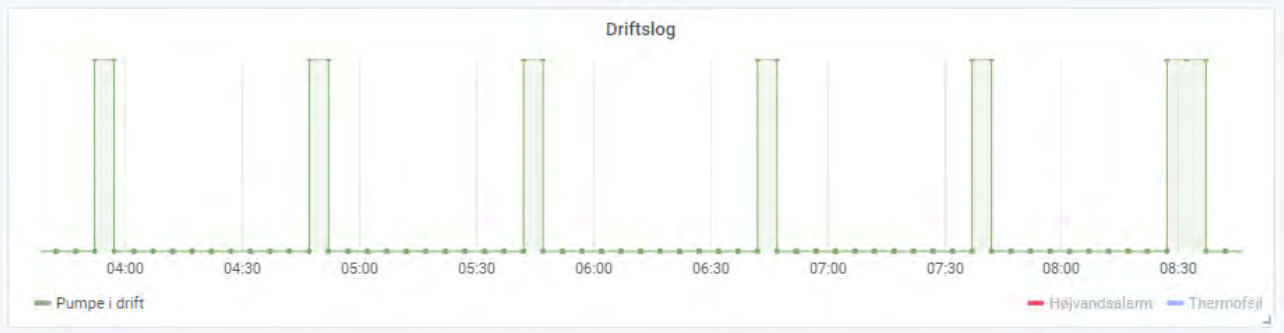
Pump operation registration. (5 second resolution)
At a measured value of more than 0.5A, it is estimated that the pump is running. The current measurement itself is not 100% valid but can be used as a benchmark if something unexpected happens to the power consumption.

Operation log telegram (Every 5 minutes)

Every 15 minutes, an operation log telegram is sent to the SigFox back end. The operation log telegram contains measurements from the last 60-minute period. Which means that if a SigFox back-end telegram is lost, data for that 15-minute period will be included in the next telegram.

- If high current is detected, then a "1" is registered in the FIREFLY memory. Each bit represents an entire period of 1 minute.

This means that it is only recorded whether a pump has been running or not, not how long it has been running - nor how many starts it has had, during that 1-minute period. If a pump has an operation time over 2 periods, this will be registered as a registration for 2 periods. (See example from AcowaDash below)



Registration of change on DI1 and DI2 (5 second scan)

At every 5 second scan, the status of DI1 and DI2 is checked. If the status has changed since the last scan, a status telegram with DI-status and last measured current is sent immediately. As the SigFox network has a number of restrictions on the number of telegrams, a new status change on DI1 and DI2 will have a delay of 15 minutes, before sending a change via SIGFOX backend. This is to ensure that you stay within the allowed number of telegrams sent within 1 hour.

Status telegram (Every 4 hour.)

Every 4 hour, a status telegram containing "total number of starts" and "total time counter" as well as status of the DI's and last measured current is sent. In addition, a status telegram is also sent every 24 hours containing battery voltage, RSSI (Signal strength) and temperature. (See example from AcowaDash below)

- If there is a change from the last power measurement from "0" -> "1", "total number of starts" is increased by 1.
- If the status is still "1" after the last measurement, "total time counter" is increased by 5 sec.
- Average driving time can be calculated from: Total time counter (Bit = 5 seconds running time) / Number of total starts. The average driving time will always be calculated from the status telegram with a minimum resolution of 6 hours.

Registerlist from AcowaCore ”quick-guide”

Analog	Signal	INT32	UINT32	UINT32
		Latest current	Counter Starts today	Counter Duration total
AI 1	0-10V DC	20	100	108

Input	Signal	INT32	UINT32	UINT32
		Status	Counter Amount total	Counter Duration total
DI 1	DI1	4:0	500	540
DI 2	DI2	4:1	502	542

Log indgange	IR:INT16	INT16
Log interval		2887
Log interval (Event)		2889
Description		***(MInutes) ”READ ONLY”***
Analog log A1 10.000 points	0 - 9999	
Digital log DI1 10.000 points	40000:0	
Digital log DI2 10.000 points	40000:1	
Description	***(Read on input registers)***	

System information	UINT32
Battery voltage	58
Description	***(with 2 decimals)***

Time / Date stamping for data exchange	UINT32
Time since last GEKKO communication / reading in seconds (register is reset with each successful communication)	76
Seconds since 1970-01-01 (Unix time)	78
Seconds	80
Minutes	82
Hour	84
Day	86
Month	88
Year	90

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Future safe Instrumentation

The mission of ACOWA Instruments is to deliver quality products for intrumentation, based on newest avalable technology and equiped with advanced, thoroughly tested functionality. Choosing an ACOWA products means choosing a future safe product.

High Speed development

If you choose ACOWA Instruments, you choose a future-proof product.

Our skilled developers constantly have a finger on the pulse and make sure that all products labelled ACOWA Instruments, are amongst the best on the market.

Danish design - from top to bottom

ACOWA products are produced and developed in Denmark. This goes for hardware as well as software. On top of this, all developement takes place in close dialogue with our customers.

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