CARBIC

THE CARBIC PRODUCT CATALOG

FOR THE NEXT ERA OF SENSING

WWW.CARBIC.COM

CONTENT

CARBIC

ABOUT US

Carbic is a Silicon Valley tech company building the next generation of fluid sensors using advanced hardware and machine learning techniques. Carbic sensors are installed throughout North America, Latin America and the Middle East.

HOW WE TRANSMIT DATA

Adding Carbic sensors to your oilfield/ facilities is simple. Our sensors are low cost and self-powered. They transmit data over cellular or satellite, so they can be installed anywhere in the world without any additional infrastructure.

SEAMLESS DATA TRANSMISSION

All of the data related to the wave signal reflections is encoded using our proprietary transmission protocol. This encrypted data is then transmitted to a private non-geosynchronous satellite network using SBD (Short Burst Data)

This data is automatically downloaded by CARBIC servers and processed by a piece of CARBIC software called an Ingestion Engine that lives on the cloud. This means that the Customer has access to this information from any device with an internet connection. This Ingestion Engine decompresses the data and breaks it into relevant pieces to be processed by our algorithms.

Additionally, all Carbic units are equipped with two-way communication abilities. This allows Carbic to use remote updates to continuously improve the software and algorithms on the units in the field.

Also, sensor data can be simultaneously transmitted to customer systems (such as SCADA) via our real-time API.

HOW CUSTOMERS ACCESS DATA

ACCESS THE DIGITAL PLATFORM FROM ANY DEVICE

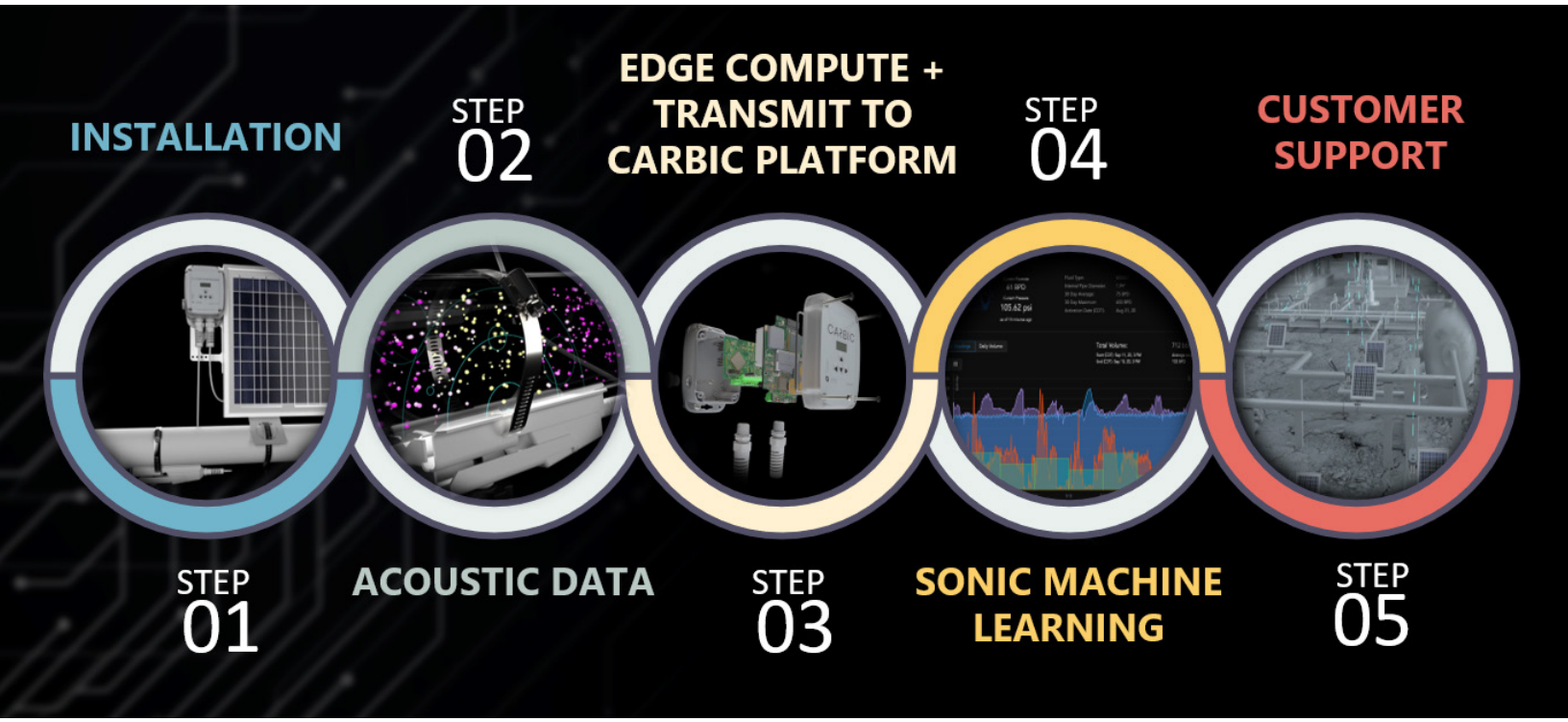
Access your data by logging in to our web app on any desktop or mobile device

- **Remote Access** of your information since calibration
- **Web Based Application**, accessed from any computer or smart device and no limit of users
- **Variables monitored** in an easy visualization mode (Access to historical and real time data)
- **The data is also accessible via API** in case customer wants to read the data into their SCADA system
- **Daily Reports & Alarms** tailor made to your needs. Set daily reports to be sent after your cutoff time, and tailor alarms to alert you when conditions change

HOW WE MONITOR FLOW

FLOW SOLUTION

CARBIC CREATED A **BLENDED SENSOR AND SOFTWARE** SYSTEM **BASED ON MACHINE LEARNING**



A Leap in Fluid Sensing

The world's first universal ultrasonic fluid and temperature sensor

01

1. Clamp transducer and CPU/Solar mount onto pipe
2. Activate sensor via keypad
3. Upload reference data to automatically calibrate the sensor

02

1. Speaker emits ultrasonic sound waves
2. Sound waves reflect off solids
3. Microphone records reflections

03

1. Apply proprietary signal processing algorithm to remove noise
2. Compress acoustic data and transmit to Carbic platform
3. Continuously update algorithm to improve signal quality

04

1. Carbic platform receives encrypted data
2. Sensor learns from the data it gathers and the data from other deployed sensors
3. Cloud-based machine learning model

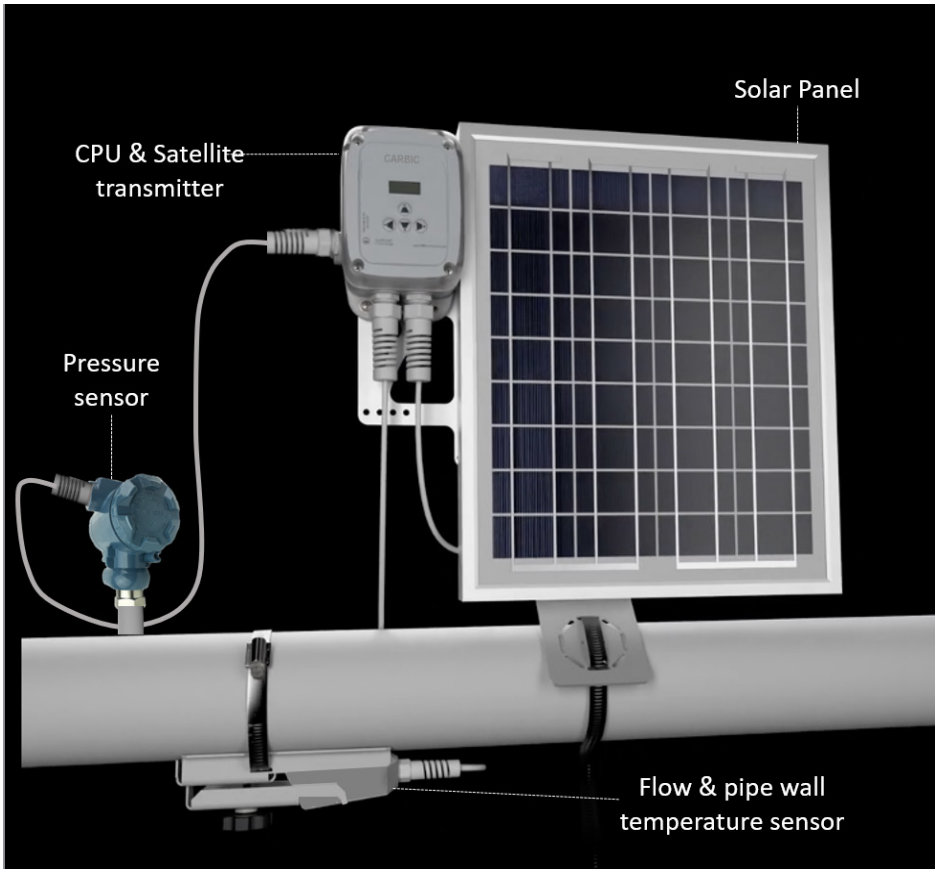
05

1. Custom alerts and alarms
2. Sensor diagnostics
3. Data available via web/mobile platform, email reports, Excel files and real-time API

TRISENSE & ULTRAFLOW SOLUTION

FLOW SOLUTION

NON-INTRUSIVE FLOW METER THAT WORKS BASED ON SONIC PRINCIPLES AND ARTIFICIAL INTELLIGENCE ARCHITECTURE WITH INTEGRATED **PIPE WALL TEMPERATURE SENSOR (ULTRAFLOW)** AND THE OPTION OF ADDING A **PRESSURE GAUGE (TRISENSE)**



The primary mechanism for reading activity in the pipe is through the ultrasonic acoustic waves sent and received by the transducer. These waves are powerfully transmitted through the pipe wall, including any scaling or paraffin buildup and reflect off of the many bubbles or solids present in the flowstream.

APPLICATIONS

The Carbic System can measure and monitor fluid movement in almost any pipe, even in the presence of gas, partially filled pipes, and very wide pipes.

Installing a smart network of Carbic sensors provides customers with a full understanding of key field parameters to trigger faster actions.

Example uses:

- Balance of liquids on surface: monitoring fluid balance and imbalances
- Cost optimization
- Help meet safety and environmental goals
- Monitor field activity
- Improve field equipment performance

FEATURES

Flow sensors are easy to install and use, and require no maintenance:

- Easy installation process normally takes only 20 minutes
- Non-intrusive flow sensor, adaptable to OD from 1-1/2" to 180"
- Flow accuracy of 95% +/-2% when gas, oil and water are multiphase, up to 98% in single phase
- Flow sensor with integrated pipe-wall temperature sensor (UltraFlow) plus optional pressure sensor (TriSense)
- Advanced satellite telemetry built in
- Ultra efficient battery for extreme hot regions
- Intrinsically safe & non-incendive

DESCRIPTION & COMPONENTS

There are four physical components to this system:

- Main CPU module with battery, data transmitter and edge computer
- Ultrasonic transducer to monitor flow with embedded pipe wall temperature sensor
- Pressure sensor (optional)
- Solar panel

TURBINE SOLUTION

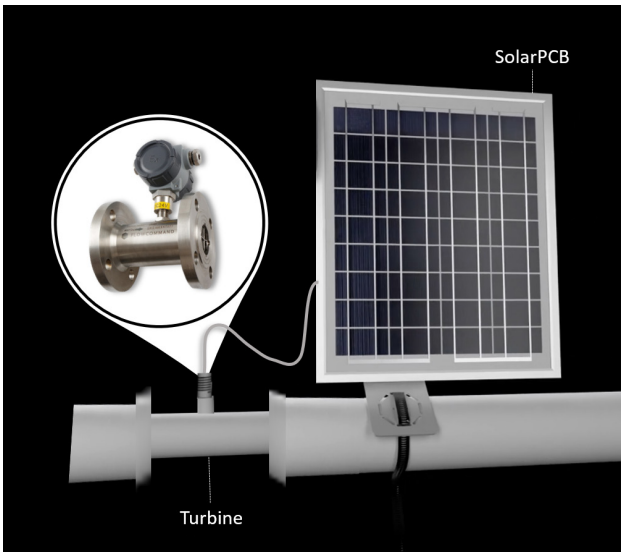
FLOW SOLUTION

ADVANCED **TURBINE FLOW METER** FOR LIQUID FLOW MONITORING
PROVIDING VALUABLE INFORMATION TO THE CUSTOMER

APPLICATIONS

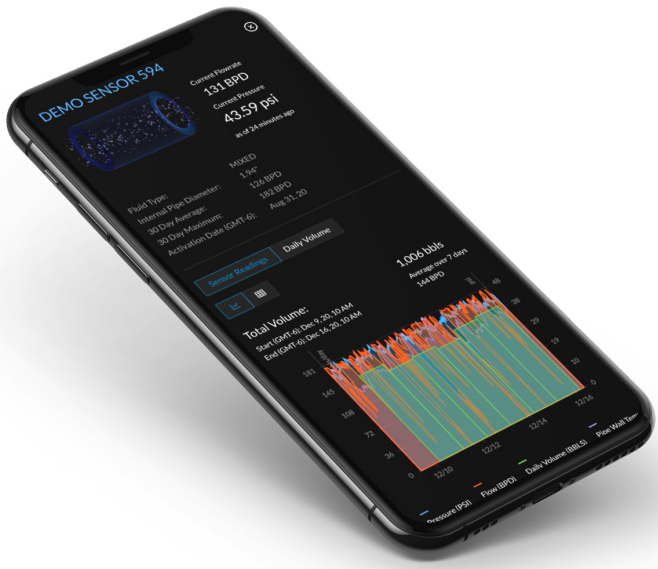
- Liquid flow monitoring

The ability of being on these spots, provides to customer constant valuable information from the entire Asset/Block/Region.



FEATURES

Carbic series turbine flow meters have the following features: high accuracy, good repeatability, convenient installation/maintenance, and simple structure.



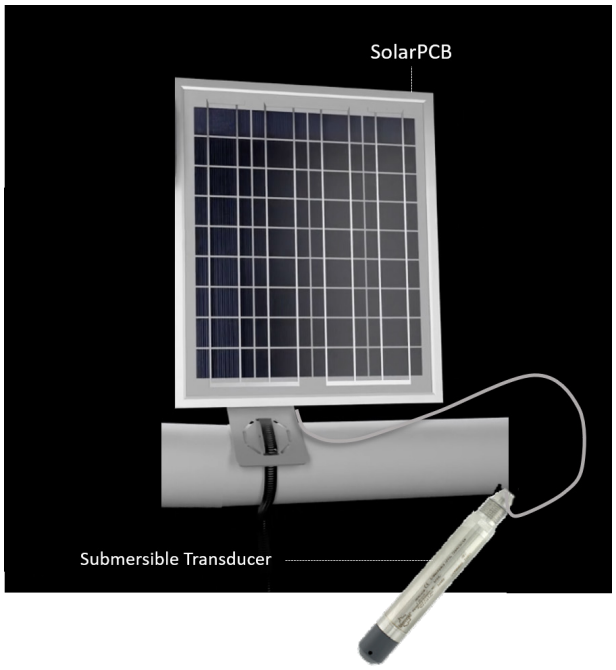
DESCRIPTION & COMPONENTS

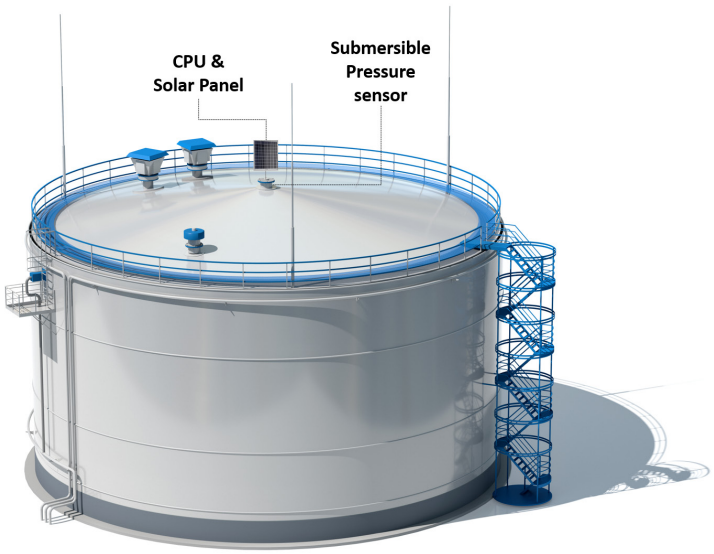
- Intrusive turbine
- Solar panel
- CPU with cellular and satellite transmission (we also offer a lower-priced cellular-only model)

TANK LEVEL SOLUTION

LEVEL SOLUTION

ADVANCED **SUBMERSIBLE PRESSURE SENSOR** THAT SIMPLY NEEDS TO BE HUNG INSIDE THE TANK **TO MONITOR TANK LEVEL**





APPLICATIONS

- **Monitor levels of tanks or pools**
- Diminish the risk of leaks and overflows
- Reduce pumper visits
- Significantly improve personal health and safety environment KPIs
- Optimize trucking and hauling activity

FEATURES

The Tank Level sensors install easily (approx. 20min under normal conditions) and require no maintenance. They automatically send data to Carbic servers where it is accessible via any internet connected device:

- Retains accuracy across different fluid types and foaming
- Advanced telemetry built-in
- Ultra-efficient solar power and battery system

DESCRIPTION & COMPONENTS

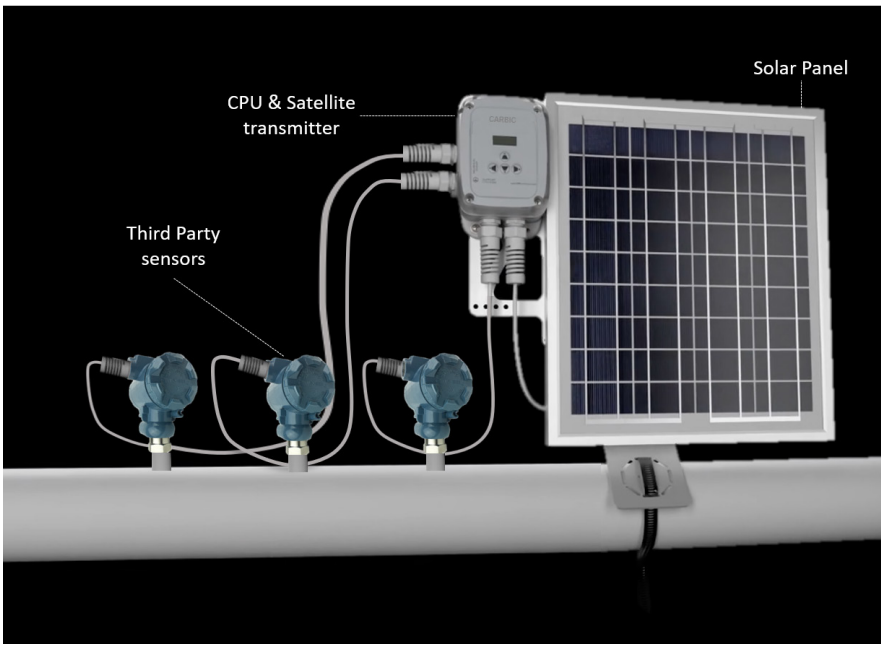
- Submersible pressure sensor
- Solar panel
- CPU with cellular and satellite transmission (we also offer a lower-priced cellular-only model)

DATA DELIVERY SOLUTION

BY CARBIC

TELEMETRY OF 3RD PARTY SENSORS & VARIABLE FREQUENCY DRIVE (VFD)

INTELLIGENT, CLOUD-CONNECTED MODULE TO PICK UP AND SEND DATA FROM EXTERNAL SENSORS OR VFD; COMPLETE WITH FULL CARBIC TECHNOLOGY



APPLICATIONS

The telemetry of sensors that the customer has installed through the Carbic CPU allows the digitization of the customer's asset to be raised to a higher degree.

These algorithms allow Carbic to dynamically manage sampling rates, transmission rates, and optimize telemetry options. This is what enables our ability to offer a secure universal communications system, that works anywhere in the world, for an industry-leading cost.

See certifications & data delivery ports on page 13

FEATURES

The Data Delivery Solution installs easily, requires no maintenance, and automatically sends data to Carbic servers and software where it is accessible via any internet connected device:

- Instant installation
- Advanced satellite telemetry built in
- Ultra-efficient solar power and battery system
- Intrinsically safe & non-incendive

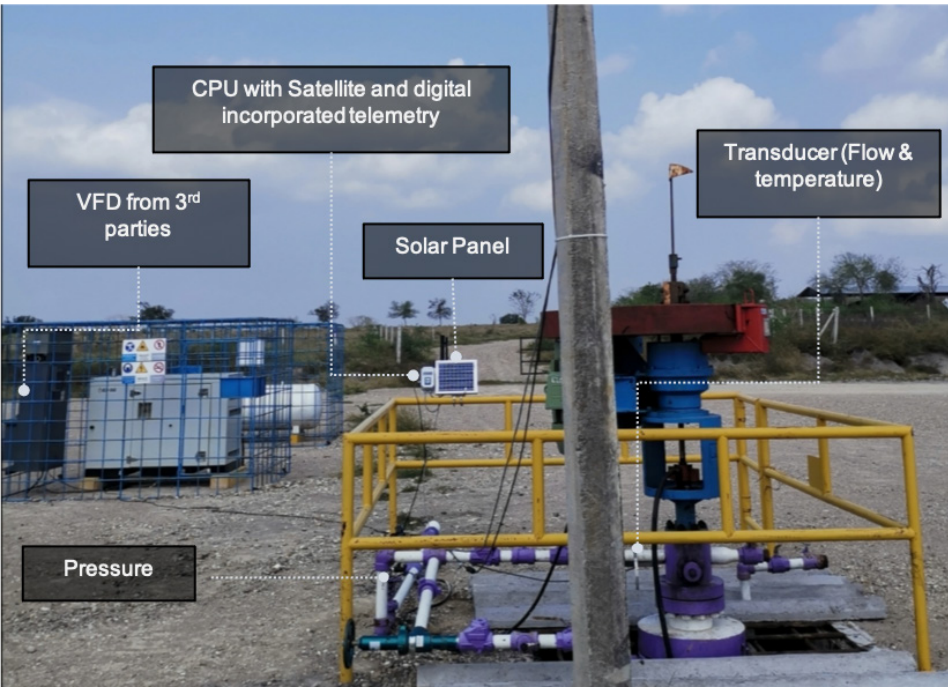
DESCRIPTION & COMPONENTS

The Third Party Sensor Solution is comprised of three physical components to this system:

- CPU module with battery and satellite transmitter
- Solar panel to provide power
- External sensor & VFD connection

DATA DELIVERY SOLUTION

BY CARBIC



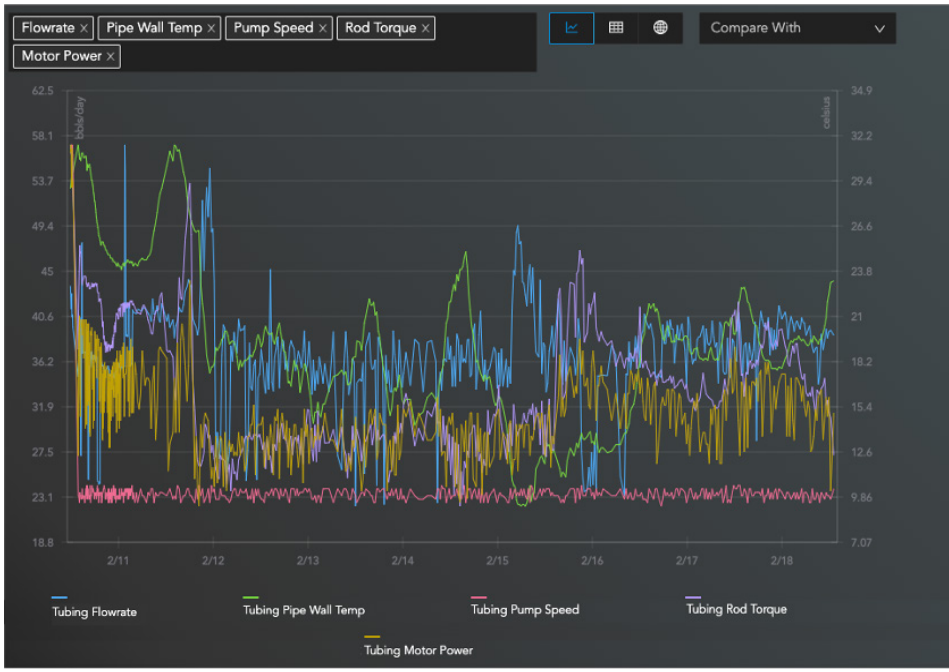
Flow, temperature, pressure and VFD's variables (RPM, torque, power, etc.)

Our technology allows not only to monitor the key field variables like flowrate, temperature and pressure, but also with the same CPU connected to a 3rd party VFD through Modbus, run the telemetry of the VFD variables.

Technical Case Study

Location: Mexico
The equipment is connected also to the PCP, VFD and customer can monitor all variables almost in real tiem through Carbic dashboard.

See certifications & data delivery ports on page 13



CERTIFICATIONS & DATA DELIVERY PORTS

Certifications

TriSense & UltraFlow

Module Rating Specification:
Class I, Division 2, Group D T3C with Class 1, Division 1 port
Solar Panel: Class I, Division 2
Sensor Rating Specification:
Sonic transducer: Class I, Division I, Group D T3C
Embedded temperature sensor: Class I, Division I, Group D T3C
Pressure: Class 1, Division 1, Groups A,B,C,D, T3C (UL 1203) *Optional

Tank Level Solution

Module Rating Specification:
Class I, Division 2, Group D T3C with Class 1, Division 1 port
Solar Panel: Class I, Division 2
Sensor Rating Specification:
Pressure: Class 1, Division 1, explosion proof

Turbine Solution

Module Rating Specification:
Class I, Division 2, Group D T3C with Class 1, Division 1 port
Solar Panel: Class I, Division 2
Sensor Rating Specification:
Turbine: Class 1, Division 1, explosion proof

Data Delivery Ports

4-20mA

Type: Communication
Conductor size: 30-12 AWG
Conductor count: two-wire
Wire jacket OD: 5-9mm
Excitation voltage: 15-26V
Functions: read current output
Limit: max load 25mA
Requires customization: No

HART

Type: Communication
Conductor size: 30-12 AWG
Conductor count: two-wire
Wire jacket OD: 5-9mm
Port: 4-20mA loop
Version: v5
Speed: 1200bps 8O1
Functions: Universal commands in HART Revision 5: 0x01, 0x02,0x03,0x0F, 0x080 and Custom write commands in HART: 0x00 - 0xFF
Requires customization: Yes

Power

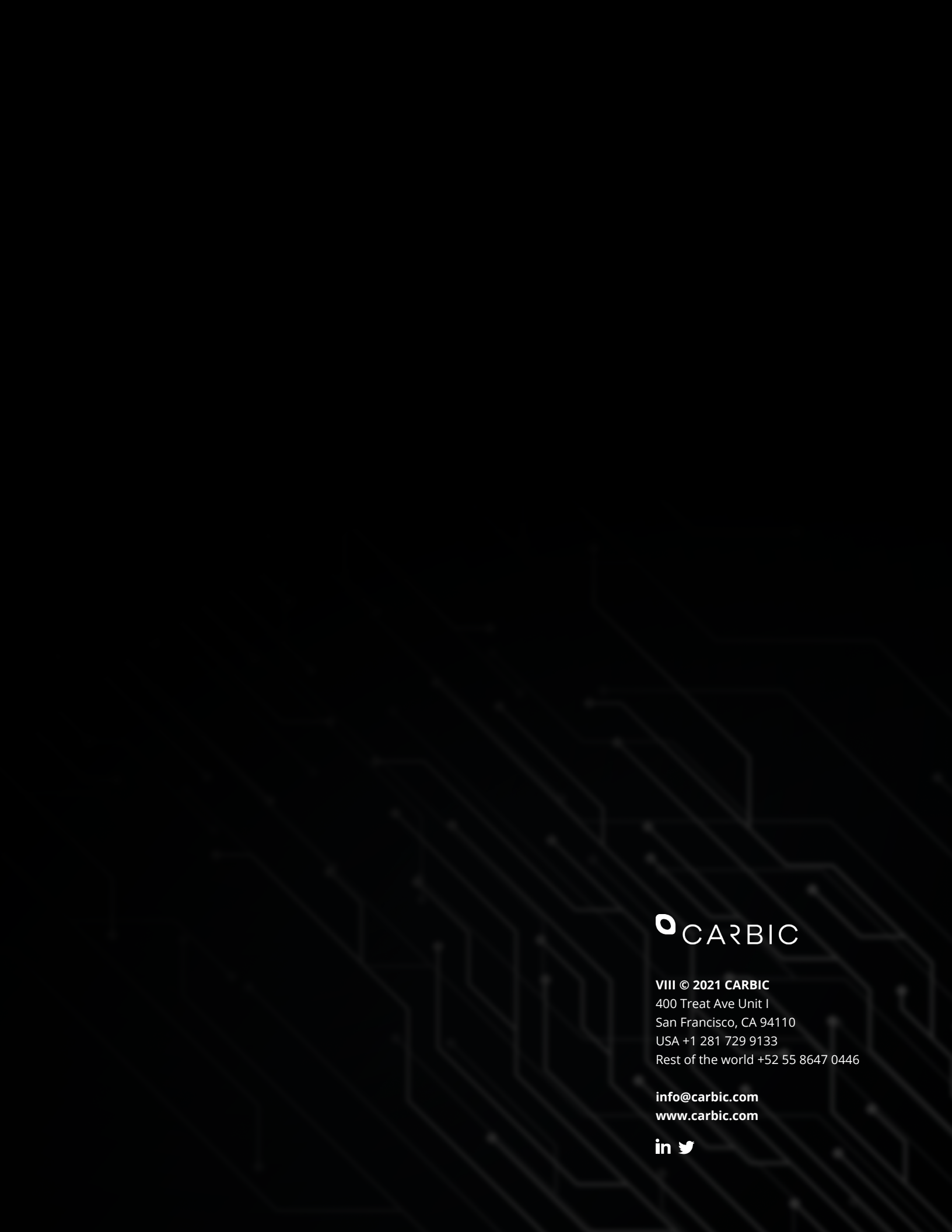
Type: Power
Conductor size: 20-24 AWG
Conductor count: two-wire
Wire jacket OD: 6.5-8mm
Input voltage range: 17-24VDC
Recommended power: 20W,Min 1A

ModBus

Type: Communication
Conductor size: 30-12 AWG
Conductor count: two-wire
Wire jacket OD: 5-9mm
Serial Port: RS485
Protocol: RTU, master or slave
Speed: 1200,2400,4800,9600,19,2k,38 ,4k,57,6k
Functions: read Holding Registers, read Input Registers, write Single Register, write Multiple Registers
Requires customization: Yes

Pulse

Type: Communication
Conductor size: 30-12 AWG
Conductor count: two-wire
Wire jacket OD: 5-9mm
Functions: count pulses
Limit: maximum of 100 pulses per second
Requires customization: No



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