

CORUS



Gas Volume Converter

CORUS is an electronic volume converter dedicated to commercial and industrial applications. It converts the actual volume measured by the gas meter to reference conditions. Thus, CORUS is a key element in the whole chain, from the meter to billing data.

CORUS uses the measured working values of volume, pressure and temperature to provide:

- » the converted volume
- » the conversion factor
- » the compressibility factor (several formulas available)
- » a large database
- » pulse retransmission

Description

The volume registered by the meter is converted to reference conditions using the formula :

$$V_b = \frac{P_m}{P_b} \frac{T_b}{T_m} \frac{Z_b}{Z_m} V_m$$

Terminology

- V_m unconverted volume registered by the meter
- V_b converted volume in reference (base) conditions
- T_m gas temperature in operating conditions
- T_b reference (base) temperature
- P_m gas pressure in operating conditions
- P_b reference (base) pressure
- Z_m compressibility factor in operating conditions

- Z_b compressibility factor in reference (base) conditions

CORUS is built in an IP65 enclosure, for wall or meter mounting. Thanks to its accurate piezo-resistive pressure sensor and its 4 wires PT1000 temperature probe, CORUS provides an accurate conversion on the whole temperature range.

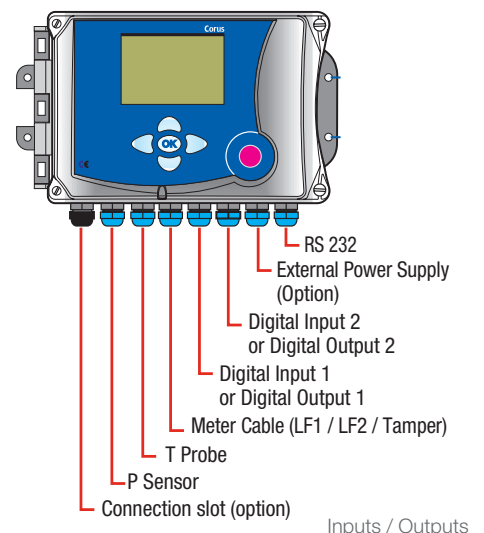
CORUS non-metrological firmware can be updated in the field without stopping operations and without breaking the metrological seals (MID). Its large integrated database can be customised to fit the customers' needs. Recorded data and number records can be freely set.

CORUS is the base element of a complete and extremely flexible system, perfectly adaptable to the customer's requirements:

- » Consumption, pressure, temperature monitoring through its large database for billing purposes
- » Monitoring functions for gas stations
- » Remote reading solutions through PSTN, GSM, GPRS or TCP/IP with several integrated communication protocols:
 - » IEC-62056-21 (IEC-61107)
 - » MODBUS RTU
 - » IDOM

Key Benefits

- » T, PT, PTZ Gas Volume Converter
- » Conforms to European Standard EN 12405-1 and EN 12405-1/A1
- » MID approval
- » ATEX approval for installation in hazardous area (zone 0)
- » Large integrated database
- » Compressibility according to AGANX19, S-GERG, AGA 8 (gross or detailed methods) or Table of Z
- » RS 232 and optical port for local / distant communication
- » High accuracy on the whole temperature / pressure range
- » Autonomous or external power supply
- » Large graphic display
- » Possibility to download new firmware in the field
- » Internal optional slot for "Ex":
 - » PSTN modem
 - » RS-485 ports (x2)
 - » 2nd pressure sensor input





DELTA meter with CORUS



FLUXI 2000 meter with CORUS

Accessories

- » Configuration software (Wincor)
- » Thermowell
- » 3-Way pressure connection kit
- » Optical head
- » ISB+
- » External supply "Ex" module
- » F/I Converter for 4/20 mA output
- » Additional boards:
 - » PSTN modem
 - » RS-485 ports (x2)
 - » 2nd pressure sensor input
 - » Cyble® sensor ATEX module

Technical Features

Approvals

- » MID:
 - » Module B – T10323
 - » Module D – PTB approval
- » Metrology: approval according to

EN12405-1 and EN12405-1/A1 (European Standard)

- » ATEX: device of category 1 approved to be used in hazardous area zone 0, ia IIC T4 classification (zone1, ia e mb IIC T4 classification with internal PSTN modem)
- » CE Marking: compliant with 89/336/EEC (EMC), 94/9/EC (ATEX) and 2004/22/EC (MID Directive)

Temperature Sensor

- » Platinum PT 1000 (1000Ω at 0° C) probe
- » Class A accuracy according to EN60751
- » Casing: stainless steel tube for insertion into a thermowell (Ø 6 mm)
- » Cable length: 2.5m or 0.8 m

Pressure Sensor

- » Absolute pressure sensor designed for CORUS application (gauge pressure sensors available on request)
- » Silicon piezo-resistive sensor
- » Overpressure up to 150 % of Pmax
- » Available in 3 ranges:
 - » 0.9 to 10 bar absolute
 - » 3 to 30 bar absolute
 - » 7.2 to 80 bar absolute
- » Connection adapter: 1/4" BSP (Gas) male
- » Typical Accuracy: <0.15 %rd over the whole pressure range

Volume Input

- » Dry contact, passive LF Reed type switch
- » Maximum frequency 2Hz
- » Programmable input pulse weight (0.001, 0.01, 0.1, 1, 10, 100)
- » Second LF input for coherence function
- » Associated tampering detection input
- » Cyble® sensor ATEX module

Compressibility

- » Main formulas available:
 - » S-GERG
 - » AGA8 Gross method 2
 - » AGA8 Detailed method
 - » AGANX19
 - » AGANX19 modified
 - » Table of Z (16 coefficients formula)
 - » Fixed Z (PT conversion)

Accuracy

According to EN12405, overall accuracy on conversion factor is better than $\pm 0.5 \%$ at

reference conditions and better than 1 % at rated operating conditions.

- » Typical accuracy better than $\pm 0.2 \%$

Display and Keyboard

- » Graphic display
- » All metrologic data and alarm status available
- » Translatable messages to any language
- » Specifics icons for application (see page 3)
- » Possibility to show graphs for P, T, Z, C, Qm, Qb, P2
- » 5-Button keyboard
- » Possibility to program main parameters by keyboard
- » Possibility to display the whole database

Digital Inputs (On/Off1, On/Off2, Tamper)

- » Station monitoring
- » Normally open or normally closed programmable status
- » Connection to any On/Off signal type (Station door contact, safety valve position, pressure switch,...) in hazardous areas.

Digital Outputs

2 Digital, isolated outputs fully programmable as:

- » Unconverted volume pulse retransmission
- » Converted volume pulse retransmission
- » Alarm retransmission
- » 4/20 mA output (through an external F/I "Ex" module)

Alarms

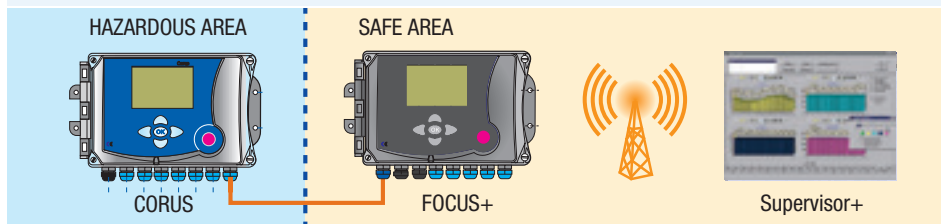
The following alarms are managed by the CORUS:

- » Temperature (Min, Max, Sensor failure)
- » Pressure (Min, Max, Sensor failure)
- » Conversion factor (Min, Max)
- » Unconverted and converted flow-rate (Min, Max)
- » Coherence
- » Interval consumption
- » Tamper
- » On/Off 1 and On/Off 2
- » External power supply outage
- » Warning thresholds (T, P, P2)

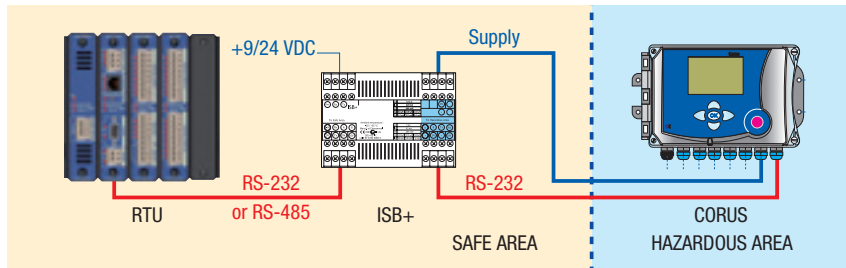
System Overview

Distant communication (Connection to CORUS RS 232 or RS 485 port)

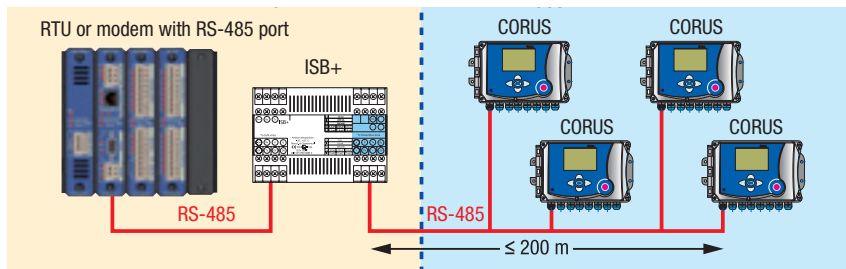
GSM/GPRS data collection through FOCUS+ GSM/GPRS Modem



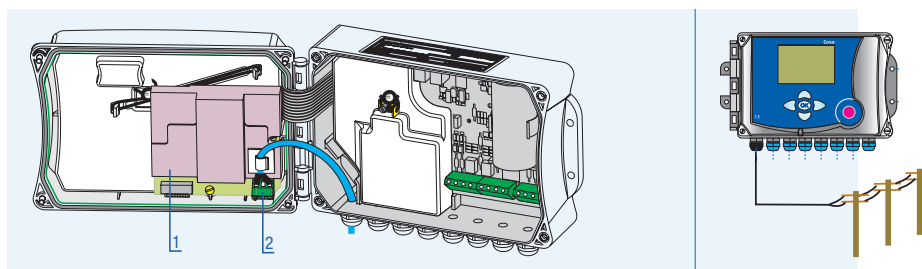
Direct connection to standard devices (RTU, TCP/IP interface, standard modem, PC...)



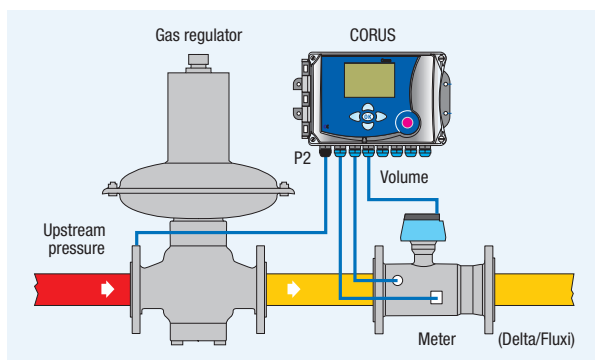
Distant communication through internal RS-485 board (up to 4 CORUS on the same bus)



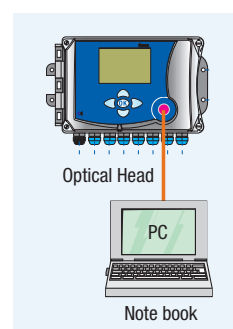
Distant communication through internal "Ex" PSTN Modem



Upstream pressure monitoring with P2 internal board



Local communication through optical port



Graphic Display

Possibility to translate messages

INDEX	VALUE	ALARM	DATA	CONFIG
Unconverted volume :				
19348725.000 m3				
Converted volume :				
24284651.283 Nm3				

Graphic display function

INDEX	VALUE	ALARM	DATA	CONFIG
4.2				
4.0				
P (bar)	4.025			

Specific icons for CORUS applications

	Battery supply mode and status
	External supply mode and status
	Alarm presence (active, memorized)
	Incoming pulse from meter
	Pressure alarm (active, memorized)
	Temperature alarm (active, memorized)
	Communication in progress

Technical Specifications

Overall Accuracy of the C Factor	Maximum Error < 0.5 % - Typical Error < 0.2%
Conversion Range	Pressure: 0.9 bar to 80 bar - Temperature: according Z formula
Power Supply	Battery or external (through Ex module)
Autonomy	5 years (battery version) in typical conditions
Ambient Temperature Range	-25° C to +55° C
Enclosure	IP65 polycarbonate box
Volume Input	LF input (2 Hz max); Reed switch type or Cyble® sensor ATEX module Second input for coherence function
Temperature Sensor	PT1000 class A; 4 wires
Pressure Sensor Ranges	[0.9 /10] bara, [3 /30] bara and [7.2 /80] bara (gauge pressure sensors available on request)
Pressure Sensor Type	Piezo-resistive sensor
Outputs	2 Channels fully configurable as pulse, alarm or 4/20 mA*
User Interface	Graphic display + 5 button keyboard
Communication	Optical serial port and RS232 serial port
Metro. Cables Length (P, T, LF)	2.5 m
Option	Internal "Ex" PSTN modem (V32bis) RS-485 dual port board P2 second pressure input board

* through external F/I converter

Database

CORUS provides 6 different logs:

- » Hourly log: last 1440 hours (2 months)
- » Daily log: last 124 days (4 months)
- » Monthly log: last 24 months
- » Interval log:
 - » from 3100 to 5900 records according selected data
 - » interval programmable from 1 to 60 mn
- » Events log: last 800 events
- » Parameters log: last 200 records

Power Supply

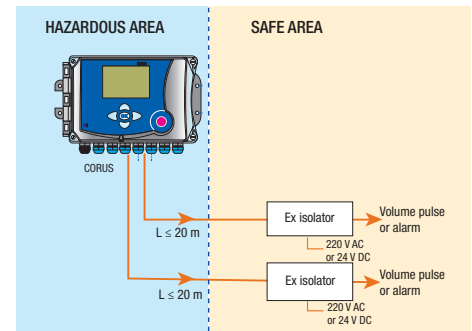
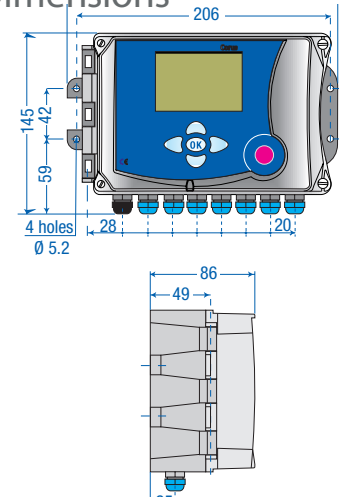
- » Battery operating or external supply mode (mains or solar)
- » Battery:
 - » Specific 16.5 A.h lithium battery pack including all required protections for intrinsic safety
 - » Pack can be changed in hazardous area without interrupting the normal operation of the device
 - » 5 years autonomy in typical conditions

- » External power:
 - » External "Ex" specific supply module required providing 6 to 12 V DC to the CORUS
 - » Main battery (16.5 A.h) remains in the product, acting as backup battery in case of mains cuts.

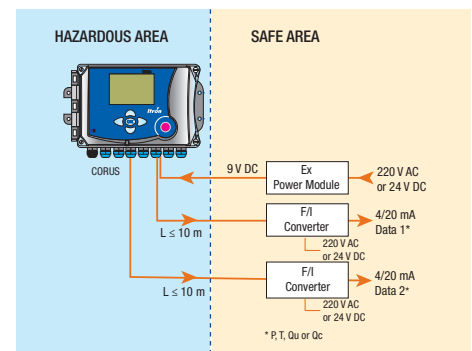
Information to be specified when ordering:

- » Pressure range
- » Formula for Z calculation
- » LF input cable type
- » Battery or external supply
- » Metrologic cables length
- » Language for display
- » Accessories
- » MID sealing

Dimensions



Configuration with pulse outputs



Configuration with 4 / 20 mA outputs

Actaris Gas Measurement

Hardeckstr 2,
76185 Karlsruhe
T: +49 (0)721 / 5981 - 100
F: +49 (0)721 / 5981 - 282

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