FLONIDAN

Gallus 2100 TCE

Functional Description

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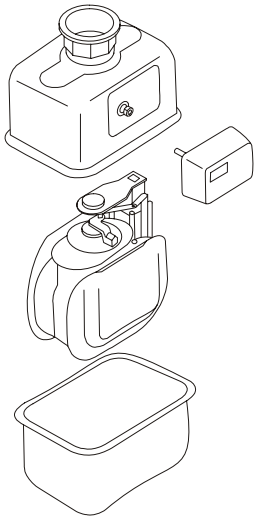
CONTENT

1.0 General

Gallus 2100 TCE is an advanced gas meter, based on latest technology regarding measuring unit as well as electronic index. The electronic index offers several value adding features, such as temperature conversion, remote reading, fixed day reading etc.



2.0 Measuring unit

The measuring unit as highly modern diaphragm unit, with rotating valve and electronic detection.

The measuring range covers from less than 16 dm^3/h to 6000 dm^3/h, corresponding to G 1.6, G 2.5 and G 4, using the same unit.

Please refer to leaflet.

3.0 Electronic index

The GALLUS 2100 TCE electronic index is a battery operated gas volume converter, offering volume conversion taken in acount pressure, level above sea etc. Additionally features such as auto diagnostic, error log, monthly readings, remote reading etc. are available.

4.0 Technical description

4.1 Characteristics

- Designed in acc. to EN 1359
- Easy to operate
- Easy to install
- Excellent reliability
- Low price
- Battery operated, more than 15 years life time
- EEPROM for data security
- Data interface for service, configuration etc.
- Option board offering data interface and 2 repetition outputs

4.2 Function

The GALLUS 2100 TCE electronic index consist of a calculator with display and a temperature measuring system and an optical detection system, that detects the revolutions of the gas volume measuring unit.

4.3 Operation

The calculator registers the volume passing the gas measuring unit.

The calculator integrates the volume corresponding to the rotation of the detection disc, measure the temperature and converts the measured volume into standard volume.

4.4 Calculation formular:

$V_b = V \times (p \times t_b \times Z_b)/(p_b \times t \times Z) \Leftrightarrow$
$V_b = V_m \times K_c/t$, where

$K_c = (p \times t_b \times Z_b)/(p_b \times Z)$
p = actual gas pressure [bar A]
t_b = base temperature [K]
Z_b = compressibility factor at base conditions (SGERG 92)
p_b = base pressure [bar A]
t = actual gas temperature [K]
Z = actual compressibility factor (SGERG 92)
K_c = conversion constant

$p = p_g + p_{atm}$, where
p_g = actual gas pressure [bar G]
p_{atm} = local atmosphere pressure

local atmosphere pressure is calculated as
$p_{atm} = p_0 - (h \times p_h/100)$
p_0 = atmospheric pressure at sea level
h = actual altitude above sea level [m]
p_h = pressure reduction per 100 m above sea level [bar/m]

All parameters used for the calculation of K_c are stored in the calculator:
p_0, p_h, h, t_b, p_b and gas composition: CO_2, d, H_s, H_2, N_2

4.5 Specifications

Accuracy*)

Flow rate	Maximum error			
	gas and amb. temp.		gas and amb. temp.	
	10 ≤ t ≤ 20		t < 10°C or t > 20°C	
	Initial	Endurance	Initial	Endurance
Qmin ≤ Q < 0.1Qmax	± 3.5%	- 6.5% to + 3.5%	± 4%	- 7% to + 4%
0.1Qmax ≤ Q ≤ Qmax	± 2%	± 3.5%	± 2.5%	± 4%

*) From EN 1359, table B.1

Line conditions

Temperature range:	- 20 to +50°C	
Pressure range:	Nominal:	0 to 1 bar G.
	Extended:	0 to 5 bar G (reduced accuracy, as constant value for Z is used).

Volume detection

Detection method:	Optical, from gray coded disc
Resolution:	45°, corresponding to approx. 0.15 liters

Gas composition

In acc. to customers specifications, within the limits of the respective standard for Z-calculation.

Ambient conditions

Temperature, operation:	-20 to +50°C
Temperature, storage:	-40 to +70°C
Humidity:	< 93 % RH, non condensing

Temperature sensor

Measuring the temperature through the meter casing, behind the index.
Second sensor measures ambient temperature, in order to compensate for this.

Sensor element:	*NTC type, 30,0 kohm at 25 °C, accuracy ± 0,25 °C compared to nominal value (see temperature/resistance curve, appendix A)*

Battery

Type:	Lithium, AA cell, 1.8 Ah
Life time:	15 years (Calculated: 20 years)
	Battery is located in a separate compartment, and may be exchanged without breaking the main metrologic seal.

Display	9 digit, reading out standard volume, in m^3 with 4 decimals. Possibility to show no decimals. In case of error, a warning sign (triangel) will be activated. An arrow is flashing for every meter volume cycle (1.2 liters)

Remote reading

The calculator is equipped with data communication port, allowing remote reading and programming.
Optionally, 2 configurable pulse outputs are available.

4.6 Remote reading/writing

Data available:
- Fixed parameters
- Live values
- Totals
- Error log (5 last alarms, incl. time stamp and actual main index)
- Monthly readings (last 13 months)
- Max flow (5 last values, incl. time stamp)

Data security

Once a day, all essential values are stored in permanent memory (EEPROM).
A specific instruction will perform an immediately storage of the values to the EEPROM.

All metrologic data are protected by password and/or switch placed behind metrologic seal.

Options

The Gallus 2000 TC may be delivered with 2 repetition outputs for converted or measured volume.
Specifications for pulse output:

- pulse value: programmable, 0.001, 0.01, 0.1, 1, 10m^3
- pulse length: 125 msec.
- max. voltage: 24 V
- max current: 10 mA

Outputs are galvanic isolated

5.0 Error code and error handling

The Gallus 2100 TCE has a build-in self diagnostic system, that will activate flashing display and an error code in case of errors.
The error code may be read by labtop, using the software "Gallus Config".

Overview:

code	alarm	cause	symbol	stop count
1	battery exchange	battery exchange date reached	X	
2	battery low	power down		
3	temperature min limit	$t<t_{min.}$	X	X
4	temperature max. limit	$t>t_{max.}$	X	X
5	temperature sensor error	$t<t_{min.-20°}$ or $t>t_{max.+20°}$	X	X
6	temperature calculation error	calc. temp. outside allowed limits	X	X
7	high flow	Q>high.		
8	max. flow	Q>max.	X	
9	pulse detect error	Pulse detection error, graykode		
10	daily consumption error	Daily consump. above specified limit		
11	system error	technical HW or SW error	X	X

Symbol:
For the marked alarms, the symbol will appear during alarm. Symbol requires manual reset. If the alarm condition is still present after the reset, the symbol will appear again.

Counting in error totaliser:
For the marked alarms, the normal counting will stop during alarm. Counting will be resumed in a specific alarm total register (measured volume). When the alarm condition disappears, normal counting will be resumed again.
It may be configured, if the measured volume shall continue counting, even in case of error, marked as “stop count”. In that case, only converted volume will stop counting during error.

Alarm status:
An alarm status list will show the present status of all alarms, and the total number of each alarm.

Alarm log:
An alarm log will show the last 5 alarms:
- time stamp
- kind of alarm
- if the alarm appeared or disappeared
- mail totaliser at the present time