1 Description

This Data Logger LS-Flow is used in **district metering of drinking water networks,** for remote reading of major consumers and interconnection meters. LS-Flow is fitted with an RS-485 link used to connect to an **Electromagnetic flowmeter** such as the:

- **Aquamaster 3** and **4** (ABB Company),
- **MAG 8000** (SIEMENS Company),
- **Waterflux** (KROHNE Company),
- **Octave** (ARAD Company).

LS-Flow also has an AI for pressure measurement and a DI for intrusion. It can thus acquire very accurate index values from meters and access internal flowmeter data.

1.1 Features and compatibility

	ABB Aquamaster 3 and 4	SIEMENS MAG 8000	KROHNE Waterflux	ARAD Octave
Meter: Out index	✓	✓	✓	✓
Meter: In index	✓	✓	✓	✓
Meter: Net index/sub-total	✓	✓	✓	✓
Flow snapshot	✓	✓	✓	✓
Pressure	✓	∅	✓	∅
Temperature	∅	∅	✓	✓
Internal EFM data	✓	✓	✓	✓
RS485 link speed (8 bits, 1 even parity bit, 1 stop bit)	19200 bps	19200 bps	9600 bps	9600 bps
Flow meter software (minimum version)	*ABB-3 : V 01.05.01.* *ABB-4 : V 01.XD.02.*	V 3.07	V 4.2.6x	V 4.01.39

The symbol ∅ means that the information is not accessible or available.

1.2 Data acquisition

The Data Logger acquires, from the flow meter:

- 3 “Meter” data points,
- 1 “Pressure” AI for optional management of a pressure sensor,
- 1 “Temperature” AI.

The data are updated and stored according to the meter archiving period (user configurable period, every 1, 2, 3, 5, 6, 10, 15, 30 or 60 minutes).

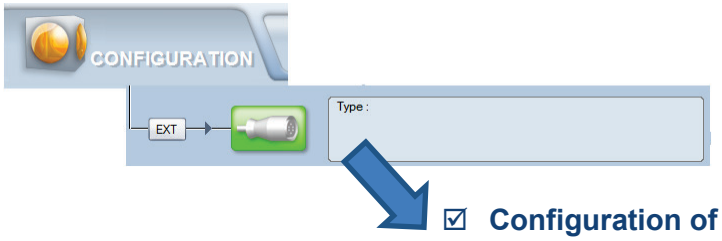
Their numbers are fixed in the configuration, however many datum are used.

LS-Flow transmits its data **via GPRS or 3G** to **1 or 2 centralisation systems** (GPRS SCADA Central Station and/or Web Server), and can send SMS alerts to a mobile phone for event notification.

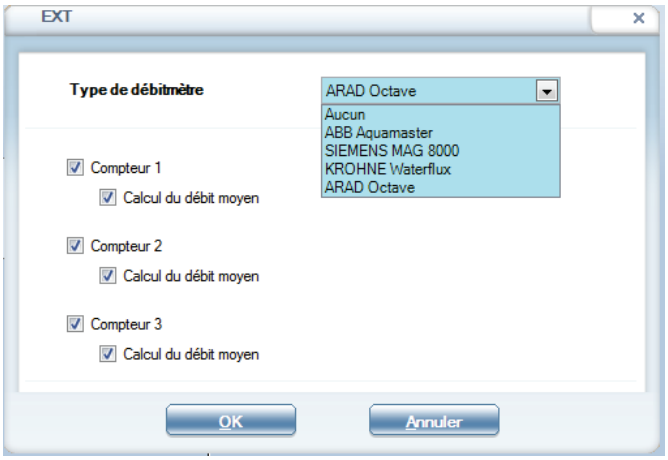
The Data Logger enables data archiving and processing.

2 Settings

☑ **Flowmeter type is configured under extension heading "EXT":**



☑ **Configuration of EXT link:**



3 Operation

3.1 "Installation" screen

On this screen, there are 3 indexes and flows:

	Compteur	Débit
Comptage 1	52 365,003 m3	0,000 m3/s
Comptage 2	-240 100,000 m3	0,000 m3/s
Comptage 3	1 130 061,956 m3	0,000 m3/s

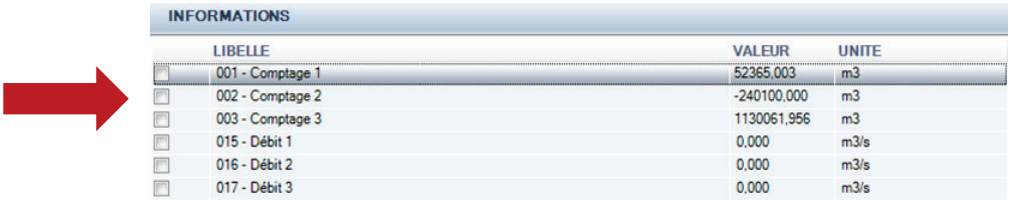
The **Ext – Status** data point (#45) is the numerical datum which specifies the nature of faults read in the flow meter (battery level, HS pressure, etc.); the value 0 corresponds to an absence of faults in the flow meter. The Data Logger archives changes in the value of this data.

EXT		
Ext - Status	0	

The **Ext – Status** data point (#72) Fault in connection with flow meter.

3.2 "Data" screen

This screen presents the data read in the flow meter and calculated by LS-Flow.



INFORMATIONS

LIBELLE	VALEUR	UNITE
001 - Comptage 1	52365,003	m3
002 - Comptage 2	-240100,000	m3
003 - Comptage 3	1130061,956	m3
015 - Débit 1	0,000	m3/s
016 - Débit 2	0,000	m3/s
017 - Débit 3	0,000	m3/s

3.3 List of data

No.	Data name	No.	Data name
1	Metering 1	27	Min. daily flow 1
2	Metering 2	28	Min. daily flow 2
3	Metering 3	29	Min. daily flow 3
5	AI 1	31	Max. daily flow 1
6	Pressure	35	Max. daily flow 2
		33	Max. daily flow 3
7	Threshold 1		
8	Threshold 2	35	Nighttime flow 1
9	Threshold 3	36	Nighttime flow 2
10	Threshold 4	37	Nighttime flow 3
14	DI 4 (Instant detection)	39	Reception level
		40	SCADA CS communication meter
15	Average flow 1	41	Consumed energy
16	Average flow 2		
17	Average flow 3	44	Remaining battery life
18	Flow snapshot	45	Ext-Status *(numerical datum specifying the nature of the flow meter alarm indicator (battery level, HS pressure, etc.))*
19	Daily metering 1	46	Internal temperature
20	Daily metering 2	47	Number of communications triggered per day
21	Daily metering 3	48	Reliability of communications
		49	Flow meter battery level
23	Daily volume 1	72	Ext-Fault *(connection with the flow meter: (0 = OK, 1 = fault)*
24	Daily volume 2	73	Temperature
25	Daily volume 3	75	AI 1 – Sensor fault
		77	Inter-RTU communication fault

3.4 List of data exchanged

The table below lists the data read by LS-Flow, according to the different flowmeter models. The symbol ∅ means that the information is not accessible or available.

Data \ Flow meter	ABB Aquamaster	SIEMENS MAG 8000	KROHNE Waterflux	ARAD Octave
Meter 1 (one way)	✓	✓	✓	✓
Meter 1 (return)	✓	✓	✓	✓
Meter 3 (total)	✓	✓ (1)	✓	✓
Instantaneous flow rate	✓	✓	✓	✓
Ext Status	✓	✓	✓	✓
Pressure	✓	∅	✓	∅
Temperature	∅	∅	✓	✓
Battery level	∅	✓	∅	∅

(1) For the SIEMENS MAG 8000 flowmeter, the Meter 3 represents the evolution of the value of Meter 1 since the last reset.

3.5 Data information units

The units of information read from the flow meter are displayed by SOFTOOLS and are transmitted to the supervision system. In addition to this information, there is also information specific to the Data Logger: AI1 (No. 5), "threshold" information (No. 7, 8, 9, 10), average flows (No. 15 to 18), average daily flows, and diagnostic information.

Depending on the type of flowmeter, the **units** of volume, flow, pressure and temperature can be **configured** or remain **frozen**.

Units \ Flow meter	ABB Aquamaster	SIEMENS MAG 8000	KROHNE Waterflux	ARAD Octave
Volume	✓	✓	m3	m3
Flow	✓	✓	m3/h	m3/h
Pressure	✓	∅	bar	∅
Temperature	∅	∅	°C	°C

3.6 Nighttime flow calculations

Nighttime flow is calculated over a user **configurable time slot** with a start- and an end-of-calculation time (12am - 11pm).

The Data Logger calculates the nighttime flow data for the corresponding night period, from the difference in readings taken at the start and finish of the time slot. Nighttime flow is calculated in the same units as other flows. Units are those configured in the flowmeter.

3.7 Flowmeter alarms

The Data Logger acknowledges flowmeter alarms and retransmits them to the Centralisation Systems. These are archived by the Data Logger once per day, at the same time as the daily balance (see list described in § 5 - Appendix).

3.8 Intrusion detection

The Data Logger can be used to instantly detect an intrusion on an isolated site. The user must configure an "Instant detection" DI which will enable the Data Logger to transmit:

- data upon each change of status,
- And an SMS alert upon each change of status of this DI.

4 Battery life

In order to limit power consumption, the Data Logger activates its GSM modem **during communication phases only**.

2 types of battery can be used to power the Data Logger; only those batteries specified by the device's supplier can guarantee its safety and performance.

The autonomy evaluated below takes into account the following conditions of use:

- ✓ Ambient temperature between 5°C and 25°C,
- ✓ Average GSM reception level (> 7)

Conditions for Data Logger use	Communications SMS or GPRS	**Battery life** with the **Pack 934** *("Standard" battery)*	**Battery life** with the **Pack 933** *("High Capacity" battery)*
- Acquisition of 2 meters + flow snapshot + Flowmeter status (archiving every 15 minutes), - Acquisition if 1 AI archived every 5 minutes, with CPR, CNPR or CNPI sensor.	**1 call per day**	**4 years**	**9 years**

*In order to maintain Data Logger autonomy, it is important to **limit the archiving period** and **the number of emissions per day**.*

5 Appendix

5.1 Alarm indicator (Status) – Correspondence bits

Least-significant 32-bit word:

31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Numéro de bit	ABB Aquamaster	SIEMENS MAG 8000	ARAD Octave	KROHNE Waterflux
0	ABB internal alarm 0	Insulation error	Leakage	Flowmeter measurement warning / error
1	ABB internal alarm 1	Coil current error	Pipe Burst	Battery low warning < 10% left
2	ABB internal alarm 2	Preamplifier overload	Reverse Flow	Pressure measurement warning / error
3	High DC voltage (any power type)	Database checksum error	Dry	Temperature measurement warning / error
4	ABB internal alarm 4	Low power warning	Critical Configuration	EEPROM Error
5	High DC voltage (battery power)	Flow overload warning	Measurement Fail	Empty pipe
6	MID (read only) switch	Pulse A overload warning	Tamper	Communication error (Addon <-> mainboard)
7	External battery warning	Pulse B overload warning	Octave Battery	Pressure > Maximum limit Alarm
8	Not used	Consumption internal warning	Units Change	Pressure < Minimum limit alarm
9	Sensor comms. fault	Leakage warning	Watch Dog	Temperature > Maximum limit alarm
10	External battery fail	Empty pipe warning	Service Required	Temperature < Minimum limit alarm
11	Sensor not connected	Low impedance warning	Flow Rate Cut Off	Flow direction
12	Coil not connected	Flow limit warning	Module battery	
13	Empty pipe	Reverse flow warning	Water meter-Module communication error	
14	Mains failure	Not used		
15	High DC voltage (alarm)	Not used		
16	High flow			
17	Low flow			
18	Not used			
19	Not used			
20	Not used			
21	Not used			
22	Not used			
23	Not used			
24	Not used			
25	Not used			
26	Not used			
27	Not used			
28	Not used			
29	Not used			
30	ABB internal alarm 30			
31				