



Thermal Mass Flow Meters and Manual Regulators for Gases

red-y compact series operating instructions (For serial number >30000)

Operating instructions

red-y compact 2 series (Serial Number >300000)

red-y compact meter GCM

red-y compact regulator GCR

red-y compact meter with alarm module GCS

red-y compact regulator with alarm module GCA

This manual is updated for the latest firmware version of the red-y compact 2. Please verify that your unit is updated with firmware version 3.0.5 available from our website (see chapter [5.12 Firmware upgrade](#)).



Version: *red-y compact 2 series* EN A2-1

For the latest information on our products, see our website at www.voegtlin.com

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This symbol alerts the user to important operating, maintenance and service information.

Important instructions



- Do not remove the electronics housing. A damaged hologram seal will void the warranty.
- There are no serviceable parts inside the unit.
- Repairs must only be performed by qualified personnel

Attention



This unit has several power supply possibilities. If you use the external 24 Vdc power supply, it is strongly recommended to have this device grounded.

Subject to change

Due to our policy of ongoing product development, we reserve the right to change the information in this manual without notice.



Recycling

Note the existing regulations of your country.



Toxic, flammable gases and ATEX

In the case of toxic and flammable gases, the respective safety guidelines in each country must be followed. This *red-y* device is **NOT** Ex certified. In the case of flammable and toxic gases, fittings, cable glands and pipes intended for that purpose must be used. The responsibility for safe operation lies with the user and designer of the facilities.



Oxygen service

Vögtlin Instruments GmbH is not liable for any damage or personal injury, whatsoever, resulting from the use of our standard mass flow meters or controllers for oxygen gas. You are responsible for determining if this mass flow meter or controller is appropriate for your oxygen application. You are responsible for cleaning the mass flow meter or controller to the degree required for your oxygen flow application.

Trademark

red-y is a Registered Trademark of Vögtlin Instruments GmbH. Other product and company names listed in this manual are trademarks or trade names of their respective manufacturers.

Receipt of your instrument

When receiving the instrument, carefully check the outside packing carton for damage that may have incurred during shipment. If the carton is damaged, notify the local carrier and submit a report to the factory or distributor. Remove the packing slip and check that all ordered components are present and match your specifications (as ordered). Make sure any spare parts or accessories are not discarded with the packing material. Do not return any equipment to the factory without first contacting one of Vögtlin Technical Support Centres:

E-mail Customer Service:

service@voegtlin.com

Installation

Please note before the start-up:

- Do not use sealing tape or liquid sealant
- Piping must be cleaned before installation of instrument.

Products in this manual may contain metal or elastomer seals, gaskets, o-rings or valve seats. It is the “user’s” responsibility to select materials that are compatible with their process and process conditions. Using materials that are not compatible with the process limitations of the device, may result in equipment damage and/or personnel injury or death.

It is recommended that the user check the devices on a regular schedule to ensure that it is leak free as both metal and elastomer seals, gaskets, o-rings and valve seats may change with age and exposure to process gas.



Power

If it becomes necessary to remove the instrument from the system or change a battery, the power to the device must be disconnected. Always switch off the power before you disconnect terminal connections in potentially dangerous surroundings to avoid sparks.

Table of contents

1. Introduction	7
1.10. Features of red-y compact 2 thermal mass flow meters	7
1.11. Scope of warranty	7
1.12. Instructions and warnings	8
1.13. Documentation and cables supplied	8
1.14. The measurement principle	8
1.15. Real, Standardized and Normalized flow	9
1.16. CMOS technology	10
1.17. Block diagram	11
2. General device specifications	12
2.10. Safety	13
2.11. Electrical data for meter GCM and regulator GCR	13
2.12. Measurement ranges (air)	13
2.13. USB interface	14
2.14. Battery	14
2.15. Optional Modules	15
2.16. Calibration	16
2.17. Operation with other gases	16
2.18. Pressure loss	17
2.19. Temperature compensation	17
2.20. Pressure compensation	17
2.21. Response time	17
2.22. Filter settings	17
3. Installation and commissioning	17
3.10. Scope of delivery	17
3.11. Mounting position and mounting location	18
3.12. Requirements for pipework	18
3.13. Fittings and filters	19
3.14. Filters / Gas cleanliness	19
3.15. Electrical power supply	19
3.16. How to replace the battery?	21
3.17. Warm-up time	22
4. Operation	22
4.10. Introduction	22
4.11. Main Menu	26
4.12. Settings	33
5. Maintenance	38
5.10. Cleaning to remove contamination	38
5.11. Returns	39
5.12. Firmware upgrade	40

6. Appendix	41
6.10. Troubleshooting	41
6.11. Pressure loss	43
6.12. Dimensional drawings 1/4" in mm	45
6.13. Dimensional drawings 1/4" in inches	46
6.14. Dimensional drawings 1/2" in mm	47
6.15. Dimensional drawings 1/2" in inches	48
6.16. Type code overview	49
6.17. Wetted parts red-y compact 2 series	50
6.18. Contamination statement	51
6.19. Overview Default settings	52
6.20. CE Declaration of Conformity	54
6.21. Change history	55
7. Index	56
8. Overview menu red-y compact 2	58
Space for notes and remarks by user:	61

1. Introduction

Thank you for choosing devices from the *red-y compact series*. These operating instructions will help you to install and operate the measuring devices. Please read through these instructions carefully before installing the devices. Our aim has been to write a full and practical guide. We would be grateful if you would notify us of any shortcomings or mistakes.

Please contact your sales partner if you have questions about any aspect of the products.

The *red-y compact 2* is a thermal based mass flow meter that can measure the mass flow of gases. The core element of the red-y thermal mass flow meter is a CMOS sensor chip. The sensor and parts of the electronics are on one board and offer a number of advantages for the user.

1.10. Features of red-y compact 2 thermal mass flow meters

In developing and manufacturing the devices, we have focused primarily on customers and their applications. Our aim is to implement customers' requirements in the form of new developments or enhancements on an ongoing basis. The essential features are:

- ⇒ Compact design
- ⇒ Battery operated optional (Portable)
- ⇒ Dot-matrix LCD touch screen
- ⇒ Multiple gases possible (3 gases)
- ⇒ Flexible due to the many different settings accessible through the touch screen
- ⇒ Back-light screen in USB and 8...30 Vdc power mode
- ⇒ Power also possible with USB micro-B connector or external 8...30 Vdc (Separate module)
- ⇒ Optional alarm module with power, 3 contacts and 2 inputs
- ⇒ Display can be rotated 180 degrees
- ⇒ Fast and accurate measurement and control
- ⇒ Integrated temperature compensation and flow totalizer (standard)
- ⇒ Easy to maintain and service
- ⇒ Firmware upgradable through USB connection
- ⇒ 3-year warranty

1.11. Scope of warranty

Warranty for the *red-y compact* product line extends to material and manufacturing defects only. Maximum warranty covers product replacement free of charge. The following causes of faults/damage are not covered under warranty:

- ⇒ Use outside the operating limits
- ⇒ Damage due to corrosion
- ⇒ Damage due to leaking batteries
- ⇒ Mechanical damage in general
- ⇒ Contamination due to improper sealing
- ⇒ Contamination due to impure gases or penetration of liquids
- ⇒ Damage to electronic components due by over-voltage or electrostatic discharges, and corrosion damage due to aggressive environments
- ⇒ Functional failure due to incorrect operation or faulty parameterization
- ⇒ If the unit has been opened or otherwise tampered with
- ⇒ Drift in the calibration

1.12. Instructions and warnings

Read all of the operating instructions thoroughly before installing and commissioning equipment. Misconceptions and incorrect use can lead to breakage of the measuring device or risk of personal injury. Should one of these cases occur, the responsibility lies solely with the operator of the device. The installation, commissioning and operation and maintenance must be done by appropriately qualified personnel.

1.13. Documentation and cables supplied

Each delivery includes a CD-ROM with the manual in PDF format.

However, we recommend to visit our website where you can see the latest version of the manual and, if available, the latest firmware version for the *red-y compact 2*.

Every unit comes with a USB A to USB Micro-B cable. This cable can be used to power the unit and to upgrade the firmware.

1.14. The measurement principle

The thermal mass flow measurement principle is particularly suitable for the measurement and control of clean and dry gaseous media. The most significant advantage is that the measurement process measures the real mass flow and is largely independent of temperature and pressure.

Stated simply, the thermal measurement principle measures the heat transport by gas flowing past.

In the case of *red-y* mass flow measuring instruments, a constant heat input gives a flow-dependent temperature difference (ΔT). Two temperature sensors are positioned in the measuring channel (T1, T2), one before the heating system (H) and one after it.

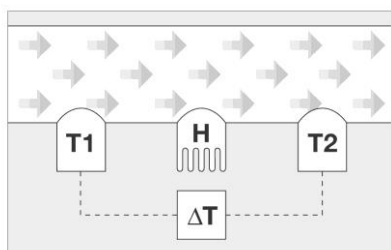


Figure 1: Measurement principle

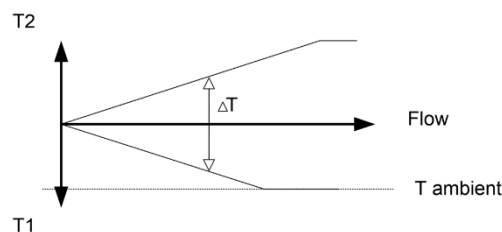


Figure 2: Sensor operation

If there is no flow, the heat spreads symmetrically in directions T1 and T2. The temperature difference $T1-T2$ is therefore zero.

Flow rates > 0 create a temperature difference.

The sensor T1 at the inlet is cooled by the gas flowing past it, and the temperature of the second sensor T2 rises due to the heat drawn from the heating system.

The temperature difference is related non-linearly to the mass flow, with very high repeatability. The electronics will, based on the calibration, convert this temperature difference in a linear and proportional indication of the mass flow of the gas.

1.15. Real, Standardized and Normalized flow

The user-selectable engineering units of the *red-y compact* has been divided in two groups: “Real and Normal” units and “Other units”

This separation is not only there to find the unit you want to select quicker, it also separated the “Normalized flow” from the “Standardized flow”

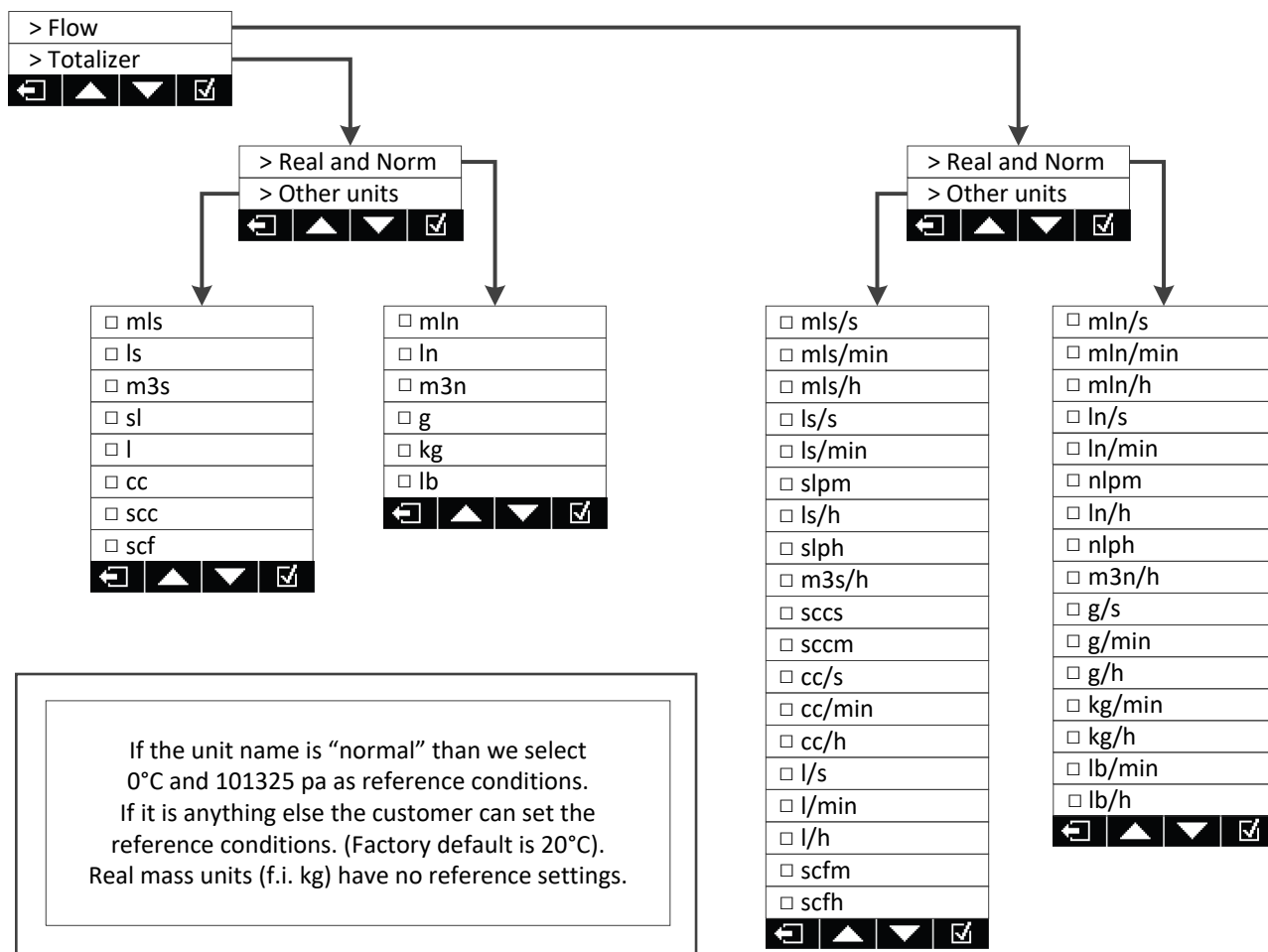


Figure 3: Units menu

The *red-y compact* has basically 2 reference conditions: One for “Real and Normal” units and one for “Other units”

The factory setting is as follows:

- 1) For all units that are used in "normal" (like ln/min), the reference conditions are always 0°C and 1013.25 mbara. This cannot be adapted.
- 2) For all the other units that are “standard” (like ls/min and sccm) and the l/min the reference conditions has to be defined when the unit is ordered.

The reference value for all units that are not “Normal” or “Real” it has to be defined with the purchase order. It cannot be changed after the units has been delivered.

On the sticker of the *red-y compact* we will mention a reference condition. This reference condition is for the “Standard” units only. The “normal” units will always be 0°C and 1013.25 mbara.

In future version of the firmware the reference conditions will be adjustable in the menu.

Gas flow in general can be expressed in one of the following:

- Volumetric flow: (f.i. l/min). This theoretically cannot be measured by the *red-y compact* because it is volume. The *compact* measures **mass flow**. However, due to regional requirements we still have it as a flow unit that is selectable. Units shown as volume (l/min) refer to the customer defined reference conditions (Same as “standard”)
- Real Mass flow: (f.i. Kg/hr). This refers to true mass units per time unit. The *red-y compact* can measure this and you can select this type of unit from the menu.
- Normalized volumetric flow: Normalized means that the units are “translated” to predefined pressure and temperature conditions. Normalized or Normal Conditions refers to 0°C and 1013.25 mbar absolute. You can select this type of unit from the menu of the *red-y compact*. These units are mostly used in Europe and China.
- Standardized volumetric flow: Standardized means that the units are “translated” to predefined pressure and temperature conditions. Standardized or Standard conditions refers to 20°C (68°F) and 1013.25 mbar (=760 mmHg) absolute. You can select these type of units from the menu of the *red-y compact*. These units are mostly used in the USA. Standardized can also refer to other reference conditions (f.i. Natural Gas industry often uses 15°C and 1013.25 mbar absolute. In the semicon world they often use 25°C and 1013.25 mbara. Please define and mention these reference condition at the time of your order.

Please note that reference condition relating to Normalized or Standardized volumetric flow are NOT the operating conditions. According to the ideal gas law, the gas volume will change by 0.35% per K.

Please note that Vogtlin standard uses the following densities for their main 3 gasses:
Air: 1.293 gr/m³, N₂: 1.2504 gr/m³, O₂: 1.429 gr/m³ (All at 0°C and 1013.25 mbar absolute). If you use other densities or need additional information for other gasses, please contact the factory. Densities need to be defined before manufacturing and cannot be adjusted once the unit has been delivered.

1.16. CMOS technology

The *red-y* measuring and control devices are equipped with an innovative CMOS semiconductor sensor that sets new standards for accuracy, speed and measurement dynamics.

With our CMOS technology the sensor element, amplifier and A/D converter form a single silicon chip.

1.17. Block diagram

The following GCM block diagram shows the structure of the device. The block diagram does not show the optional manual control/needle valve (Model GCR) that would normally be placed on the outlet of the unit.

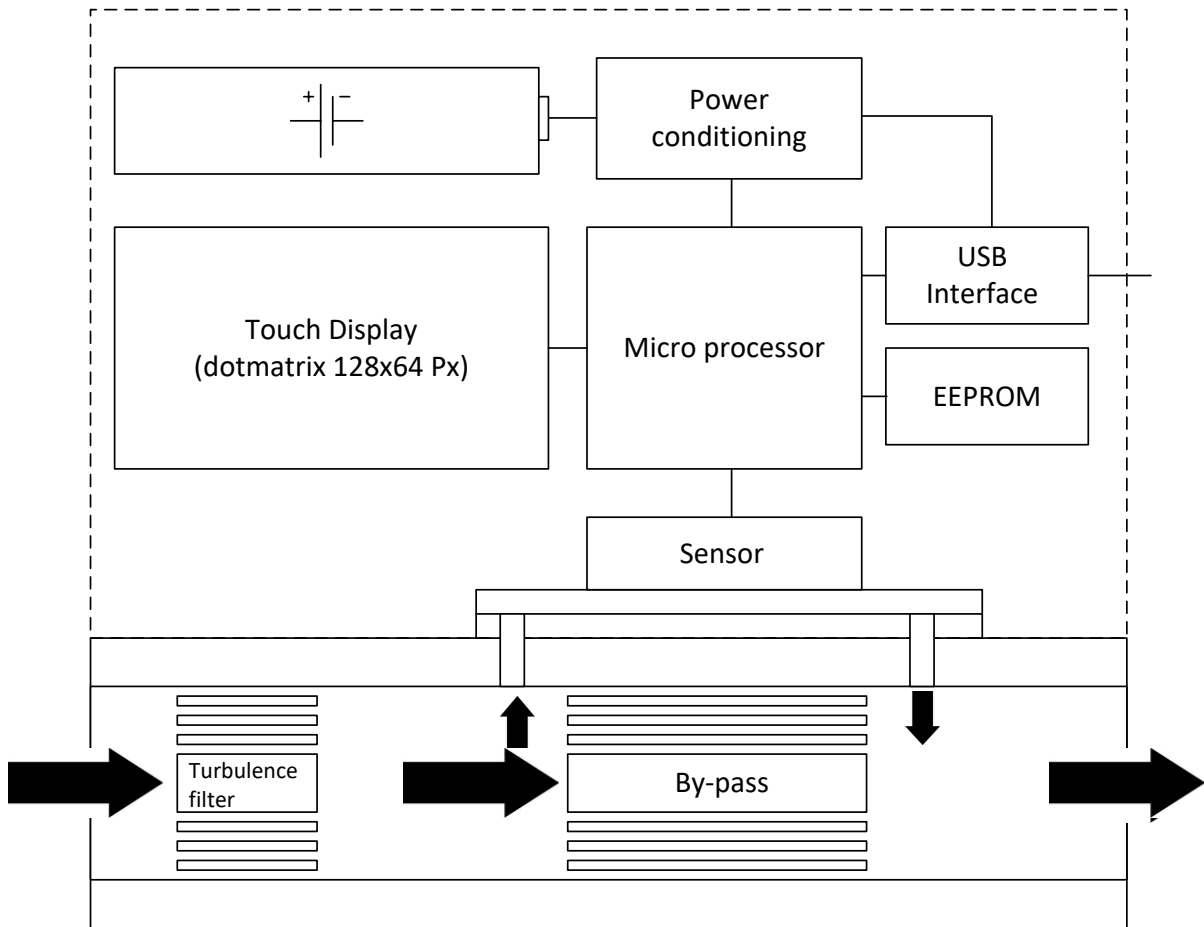


Figure 4: Block diagram

2. General device specifications

Media (real gas calibration):	Air, O ₂ *, N ₂ *, He, Ar, CO ₂ , H ₂ , CH ₄ , C ₃ H ₈ (other gases and gas mixtures on request)
*O ₂ & N ₂ are calibrated with air.	
Accuracy:	
Eco:	±2.0% of full scale; Ranges > 200 l/min ±3.0% of full scale
Special:	±1.0% of full scale (only G ¹ / ₄ " instruments and real gas calibrations)
Dynamics:	
Eco:	1:50 (Meter reads zero if flow is less than 1.7% of full scale)
Special:	1:100 (Meter reads zero if flow is less than 0.83% of full scale)
Response time:	Maximum 300 msec (filter setting dependend)
Flow update by sensor	40 ms (Battery mode 500 ms)
Display update	240 ms (Battery mode 500 ms)
Repeatability:	±0.5% of full scale
Long-term stability:	< 1% of reading / year
Temperature coefficient:	< 0.025% FS measuring range type per °C < 0.012% FS measuring range type per 1°F
Pressure coefficient:	< 0.2% / bar of reading (typical N ₂) < 0.014% / psi of reading (typical N ₂)
Working pressure range:	0.2 - 11 bara (3-160 psia)
Test pressure:	16 bara (232 psia)
Storage conditions:	-20 to 80°C (-4 to 176°F), 0-95% RH, non-condensing
Temperature range:	0 – 50°C (32 bis 122°F), 0-95%, RH, non-condensing
<i>Do not expose device to direct sun light.</i>	
Warm-up time:	< 5 sec. for full accuracy

Materials	
Electronics housing:	ABS (Acrylnitril-Butadien-Styrol)
Body Material:	Anodized aluminium or stainless steel 1.4404 (316L)
Sensor area:	Silicon, glass, epoxy
Seal material:	FKM, optional EPDM (FDA compatable)
Wetted parts:	See appendix (see chapter 6.17 Wetted Parts List)

Integration	
Display:	Touch display 128x64 px Backlighted only with external power supply (Micro-USB or 24 Vdc)
Process connection:	G ¹ / ₄ " (BSPP* female) up to 60 l/min, G ¹ / ₂ " (BSPP* female) up to 450 l/min *British Standard Pipe Parallel
Inlet section:	None required
Mounting orientation:	Any position (consult manufacturer above 5 bara (72 Psia) if the compact will be mounted vertical)
Connection cable:	For external power supply: 2 m with loose ends (fly leads)

2.10. Safety

Test Pressure:	16 Bara (232 psia)
Leak rate to external:	1 x 10 ⁻⁶ mbar*l/s He
Protection class:	IP-50
EMC	EN 61326-1

2.11. Electrical data for meter GCM and regulator GCR

Supply voltage:	Power supply <i>red-y compact 2</i> meter & regulator Standard AA battery or USB micro-B power supply (DIN 62684) Option: External power 8...30 Vdc, 120 mA. We recommend a power supply with a minimum current of 150 mA. (Power supply hereafter referred to as the 24 Vdc power supply)
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2.12. Measurement ranges (air)

The *red-y compact* has 4 different flow elements. Each element has a defined maximum operating flow range that will be defined during calibration. The flow ranges selectable below are the maximum flow ranges for air/O₂ and N₂ only. For other gasses consult the factory.

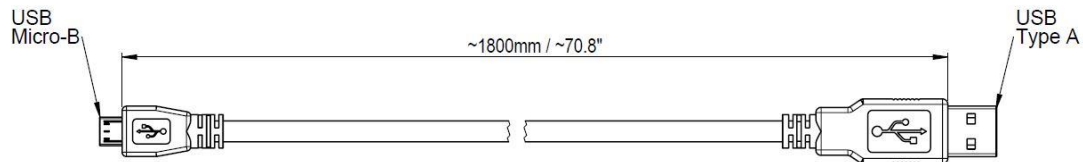
These ranges are adjustable electronically during factory configuration to your desired full scale range.

	Type	Measurement full scale (air), scale freely selectable	
compact meter GCx:	GCx-A	from 50 mln/min	to 600 mln/min
	GCx-B	from 600 mln/min	to 6000 mln/min
	GCx-C	from 6 ln/min	to 60 ln/min
	GCx-D	from 60 ln/min	to 450 ln/min

2.13. USB interface

The unit has an female USB micro-B connection (DIN 62684) that can be used as an external power supply and to upgrade the firmware. USB micro-B is the same connector you find on most Android and Windows portable phones, you can use the charger of your telephone to power the *red-y compact 2*.

It is not possible to read data from the flow meter through the USB connection.



2.14. Battery

The battery operated compact 2 can operate on any common AA battery. The lifetime is strongly dependent on the usage and the quality of the battery. In general we can state that the battery lasts for about 3-6 months under non-continuous use. (see Note 1+2)

We recommend to use external power (USB micro-B or 24 Vdc) if your application needs continuous measurement like measuring totalized flow. To extend the lifetime of the battery, the back-light is disabled during battery operation, you cannot activate it. We strongly recommend to use the “*auto power off*” in the menu for battery driven devices (see chapter [4.12.7 Battery auto off](#)) More information on the battery in chapter [3.15 Electrical power supply](#) and [3.16 How to replace the battery?](#)

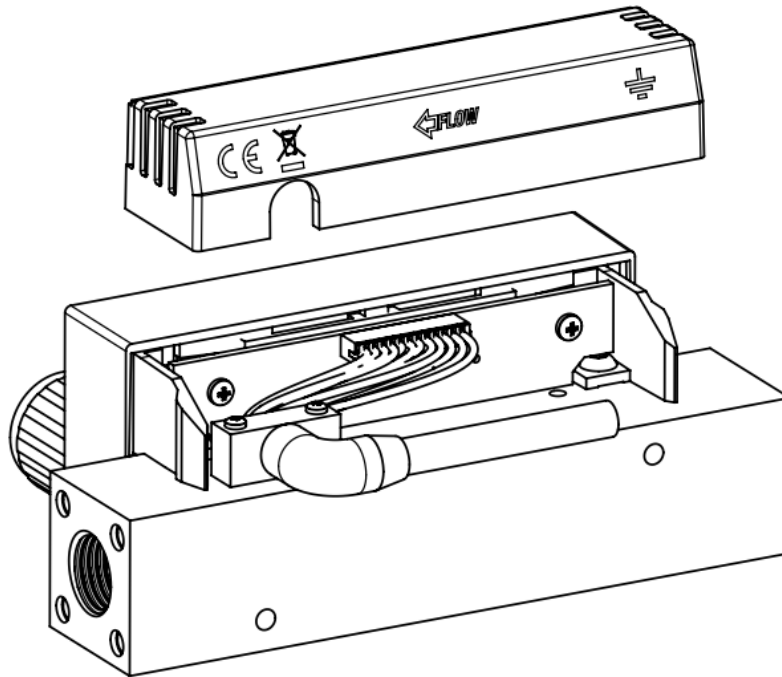
Note 1: **When we supply the unit, the “*auto power off*” will be set to 15 minutes**

Note 2: The unit can be set to performance mode when powered from the battery, this will strongly increase the battery usage. See chapter [4.12.1 Measurement](#) for more information.

2.15. Optional Modules

As an additional option you can purchase a power supply or an alarm module.

The **power supply module**, is provided with a voltage from 8 to 30 Vdc, will power the unit. The unit comes with a 2 meter cable.



The **alarm module** can in addition to the above power module, provide 3 customer individually settable alarms and 2 inputs. The module is supplied with a 2 meter fly-lead cable.

Each of the 3 alarm contacts can be configured as high, low, window and totalizer alarm. Once the alarm becomes active, the 3 potential free alarm contacts can be reset in many different ways. Automatic, through the touch screen or with one of the 2 input signals. Other options like hysteresis settings and delays are also available.

For detailed information see [4.11.2 Alarm Menu](#) in this manual.



Both the power and the alarm module are mounted similar to the battery module (see [3.16 How to replace the battery](#)). They replace the battery module, so you cannot use these modules in combination with battery power.



An external magnet can unintentionally influence the alarm contacts.

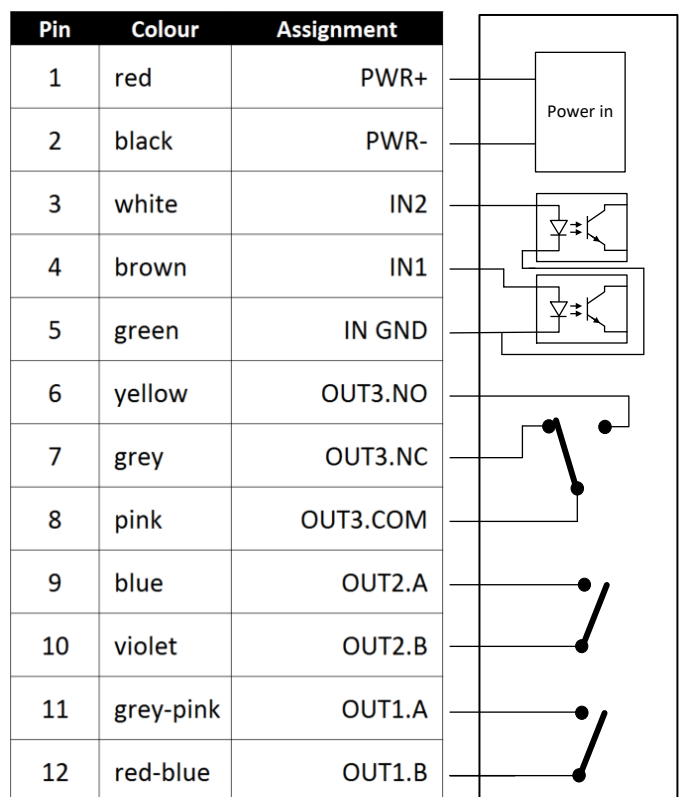


Figure 5: Power and Alarm module wiring

2.15.1. Generic specifications optional alarm module GCA

Power input:	
Voltage supply range : 8... 30 Vdc (Power supply hereafter referred to as the 24 Vdc power supply)	
Max. current : 300 mA	
Protection input: Polyfuse (trip current > 500mA) and reverse polarity protected	
Switch ratings switch 1 + 2 (SPST hard contact):	
Maximum current	0.5 A
Maximum voltage	30 Vdc
Relais lifetime	> 5 million
Switch ratings switch 3 (DPST contact):	
Maximum current	1 A
Maximum voltage	30 Vdc
Relais lifetime	> 5 million
Inputs 1 + 2 (Opto-couplers):	
Voltage range (polarity sensitive): 5 – 30 Vdc (@ 5mA max)	
Min. recommended pulse width	100 msec (Sample interval: 20 msec)

2.16. Calibration

Each measuring device is supplied with a factory calibration report. The calibration is traceable to American and/or European standards. On request we can also provide DAkkS calibration (German Accreditation Body).

2.17. Operation with other gases

Each measuring device can store data for up to 3 types of gas or operational states that need to be defined at the time of purchase.

CMOS gas flow sensors are not linear (The output is linearized) and respond different to each gas. If the gas or gas composition is different than the gas that the unit was calibrated for, the unit will not measure accurately. It is possible to program up to 3 different gases and gas mixtures, but this needs to be done at the factory or at a Vögtlin certified calibration center. Please note that the so-called K-factors as used in the traditional capillary MFM/MFC cannot be used for CMOS mass flow meters. Please contact the factory for additional information.

Note:



Please note that, among other effects, the zero-point error (offset display) will be higher if the device is not operated with the type of gas, for which it had been calibrated. A difference in zero indication is also possible if the used pressure is different than specified.

2.18. Pressure loss

Our thermal mass flow meters have a low pressure drop. The pressure drop depends mainly on the medium, the pressure conditions and the flow rate. In chapter [6.11 Pressure Loss](#) you find the pressure drop for the most common gases. Your sales partner has a calculation program for the other gases. Please note that the size of the pipes has a large effect on the pressure loss. For example from around 60 l/min, we recommend a pipe inside diameter of at least 10 mm. Please also note that some fittings have a reduced diameter and can cause considerable pressure drop in your system. Be especially careful with vacuum applications, please select a relative big pipe diameter).

2.19. Temperature compensation

The *red-y compact* thermal mass flow meters measure the mass flow of gases, the result being largely independent of pressure and temperature. In addition to the fundamental principle an internal sensor measures the gas temperature and, with the help of a 3-dimensional table of interpolation values, a correction factor is calculated automatically. The flow indication is thus temperature-compensated.

2.20. Pressure compensation

During calibration, the specified operating pressure is taken into account. Changes to the pressure conditions may introduce an additional error. This is around $\pm 0.2\%$ per bar.

Please note that the control behavior is influenced by substantially different pressure conditions. (relevant for units with an intergrated needle valve only)

2.21. Response time

The response time is time required to display 98% of its final value after a sudden change in flow. This response time for the compact 2 is around 300 ms but is dependent on your filter settings. On battery operation you might experience a slower response time than on external power. (See chapter [4.12.1 Measurement](#) for more information.

2.22. Filter settings

The filter settings smoothens the reading of pulsating or noisy flows. It can be set through the set-up menu.

Higher filter settings will slow down the response time of the unit.

(Please always first try to find and remove the cause of your noisy or pulsating flow e.g. add volume to your system). More information on the filter settings in chapter [4.12.4 Filter](#)

3. Installation and commissioning

3.10. Scope of delivery

We ship the device with the following accompanying documentation:

- ⇒ With each device, 1 factory calibration certificate per ordered calibration
- ⇒ With each device, final inspection report
- ⇒ With each device, USB cable + 1 x AA battery (if battery powered)
- ⇒ With each shipment, 1 CD-ROM with manual(s) + Quick Start Guide

3.11. Mounting position and mounting location

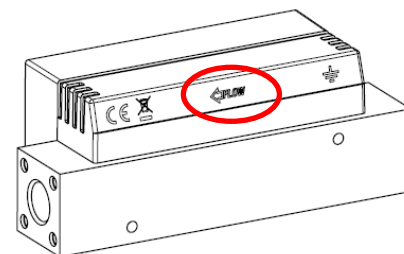
Although the recommend mounting position is horizontal, the unit can used be upright, vertical or upside down. With a vertical mounting position, dependent on the type of gas and at pressures above 5 bara (72 psia, 500 kPa(abs)), a zero-point offset can be possible. This effect is caused by convection in stationary media.

With regard to mounting location, the following situations can cause problems:

- ⇒ Strong heat sources, or ambient temperatures outside the specification
- ⇒ Strong sources of electromagnetic radiation such as spark discharges
- ⇒ Humid environments and the associated condensation lead to damage of the electronic components
- ⇒ In general, aggressive environments reduce the service life.
- ⇒ Liquid running backwards can penetrate into the measuring instrument. An elevated mounting location generally helps, or using check valves.
- ⇒ If your ambient air contains high humidity and at night the temperature goes down, it is possible that you will get some condensation inside the unit. Please take precautions to avoid this.



At installation make sure to respect the flow direction of the gas. It is indicated by an arrow on the back side of the instrument's housing.



3.12. Requirements for pipework

The most common causes of faults concern the way that devices are connected to the gas supply. Please note the following points:

- ⇒ The pipes must be absolutely clean. Please flush them **before** installing the measuring instruments!
- ⇒ Please ensure there are no pieces of thread sealant (f.i. Teflon tape) in the piping!
- ⇒ Use appropriate pipe materials (pressure rating, durability)
- ⇒ Even when connected to fixed pipework, we recommend that the devices are mounted using the appropriate mounting holes
- ⇒ From 50 l/min, we recommend the following flow-calming sections of straight and unobstructed straight tubing: Inlet: 10 x diameter; outlet: 5 x diameter
- ⇒ Use appropriate fittings (see chapter [3.13 Fittings and filters](#)).
- ⇒ Malfunctions can be caused by unstable pressure controllers, pumps that oscillate, and volumes before and/or after the measuring device that are generally too small. Install an air reservoir with 2 liter volume in the feed pipe (2 liter is an example, the volume depends on the application).
- ⇒ The size of the pipe must be matched to the measuring/control device. A diameter that is too small results in an increased pressure drop.
- ⇒ Check for any leaks before commissioning the devices.
- ⇒ For maintenance work, we recommend that a bypass system is used. This is particularly important where the gas supply must not be interrupted.

3.12.1 Sealants

The design of the devices enables sealing at the ends with O-rings or flat seals. It is **essential** that you **avoid**:

- ⇒ the use of sealing tape to seal threads. Small pieces can cause incorrect measurements and control-valve malfunctions. As well as that, if the device has to be checked or recalibrated, there will be an extra charge for the additional cleaning work.
- ⇒ sealing with liquid sealants will incur a higher cleaning charge for cleaning the device in an ultrasonic tank.

3.13. Fittings and filters

You can order a wide range of process fittings and adapters for the compact. Some compression fittings are available with an internal 50µ filter. Please refer to our website contact your local distributor for more details. Please also consider that fittings and filters can create additional pressure drops over the flow meter.



Figure 6: 316SS Compression fittings



Please note that the length of the tread on your fitting that is screwed inside the body is for the G $\frac{1}{4}$ " no longer than 10mm ($\frac{3}{8}$ "") and for the G $\frac{1}{2}$ " no longer than 13mm ($\frac{1}{2}$ "") to avoid internal damage.

3.13.1 Installation

The fittings are supplied in pairs: they preferably should be installed with filter at the inlet and without filter at the outlet. The fitting with a filter must be installed at the inlet (as determined by the flow direction). The sealing rings (O-rings) must not be damaged during assembly. For more information, see the data sheet for the fittings.

3.14. Filters / Gas cleanliness

We always recommend that a filter, or at least a fine-mesh sieve (50 microns), is installed before the measuring devices. It often happens that solid matter such as welding residues, metal or plastic chips, rust, sealing tape, etc. affect the function.

In pressurized-air applications using compressors, the air must be dry and free of oil. Please ensure that a suitable processing unit is located before the devices. In the case of gases from cylinders, in general no filter is needed. For more information, see chapter [5. Maintenance](#).

3.15. Electrical power supply

The *red-y compact 2* can be provided with power from a standard AA battery or from a common USB micro-B charger that you typically use for the charging of your android phone. There are optional modules by which you can apply a 8 to 30 Vdc external power.

The lifetime of the battery strongly depends on the type and quality of the AA battery you use. We recommend (and determine the specifications with) an Alkaline-Manganese Dioxide Battery with a capacity of 3000 mAh (ANSI: 15A IEC: LR6)

Other types of batteries (for instance Zinc Carbon, Zinc Chlorine, NiCd, NiMH or Li-ion) can be used, as long as the voltage is 1.2 to 1.8 Vdc. Using other batteries will influence the life of the battery when used in the *red-y compact 2* flow meter.

It is also possible to use rechargeable batteries, but the unit will however not charge the battery if powered by the USB micro-B.

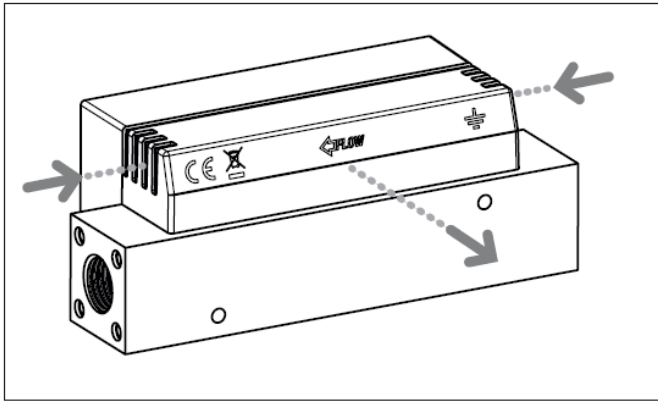
We strongly recommend to remove the battery from the case if you do not use the meter for longer periods of time to avoid damage to the flow meter in case the battery starts to leak. The unit will retain its settings so when you re-insert the battery the settings will be the same as when you took it out. (The totalizer will be stored to the non-volatile memory once every 10 minutes, so the stored value will never be older than 10 minutes)

There is no need to remove the battery if you connect the USB power supply. When you run the unit on power from the USB micro-B and have a battery inserted, you can remove the USB connector and the battery automatically takes over.

When the unit is powered by the battery you will not see the backlight to conserve energy. The backlight is only operational when there is a power supply other than a battery and the unit is not in ECO mode. (See chapter [4.12.1 Measurement](#) for more information)

When you replace or install a battery, all power to the unit should be disconnected.

3.16. How to replace the battery?



When you replace or install a battery, all power to the unit should be disconnected.

The battery is in plastic compartment mounted above the body and connected to the main display/electronics housing. This plastic part has 3 notches on each side. With one hand hold the housing on the sides of the display and with your other hand grab the side where the plastic notches are located. Pull the battery compartment from the main housing. Replace the battery and push the battery compartment back on the main housing.

By pushing the battery compartment into place you automatically connect the battery to the electronics. It will take a few seconds for the meter to start up.

You have to press the screen for about 3 seconds in order to switch the unit on. Replacing the battery will not automatically turn on the unit.

Inserting the battery incorrectly will not damage the unit.

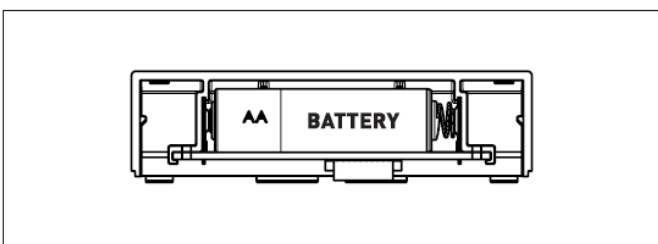
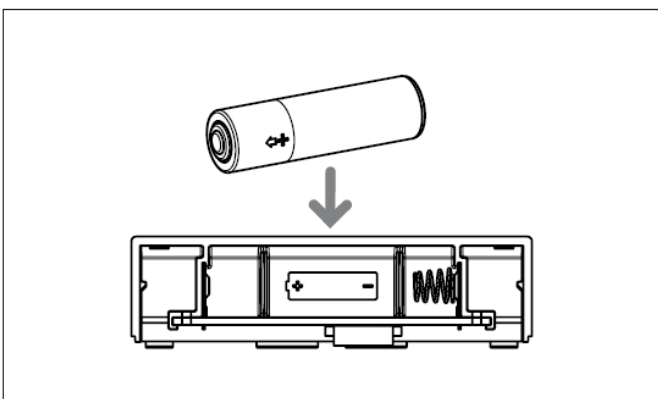
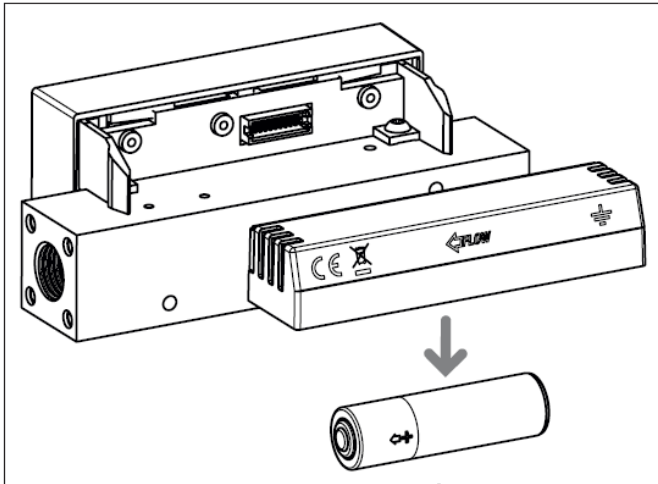


Figure 7: Battery replacement



Please dispose of the battery on an environmental friendly way (Recycle)

3.17. Warm-up time

All instruments of red-y line are ready for use within seconds of connecting the power. There is no significant warm-up time (<5 sec).

4. Operation



In case of incorrect operation of the flow meter the measurement function can be impaired.

4.10. Introduction

The *red-y compact 2* has a touch screen based on pressure. You can operate the screen with your finger or an object that does not create any scratches on the display.

The display has a backlight that only operates if the unit is powered by an external power source. To start the unit, insert a battery or connect an external power supply (USB or 24 Vdc). Press the screen for at least 3 seconds until the unit switches on. When connecting the unit to an external power source it will be turned on automatically.

Once you switch the unit on you are able to access a menu structure with which you can adjust the meter for your specific applications and preferences.



Before you put the unit into operation verify that the unit is suitable for your application (gas, range, pressure and temperature). You find these details on the supplied calibration sheet. If any of these details deviate from your application please contact the factory.

The flow direction indicated by an arrow on the back side of the housing has to be respected.

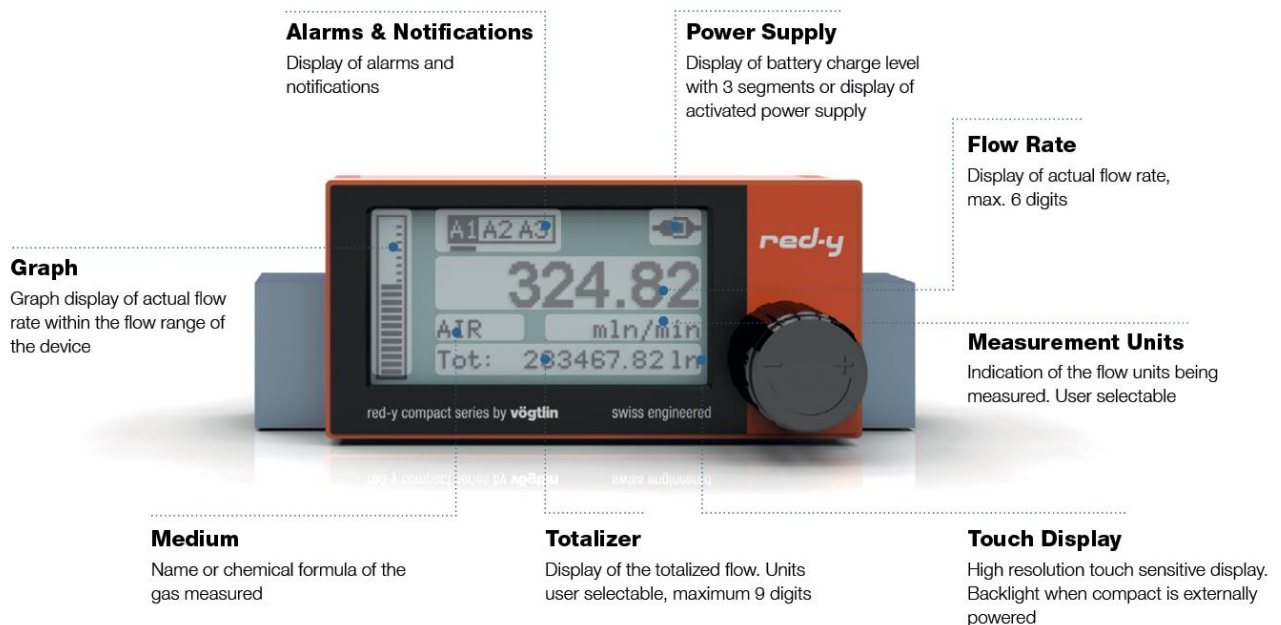


Figure 8: Display main home screen overview horizontal

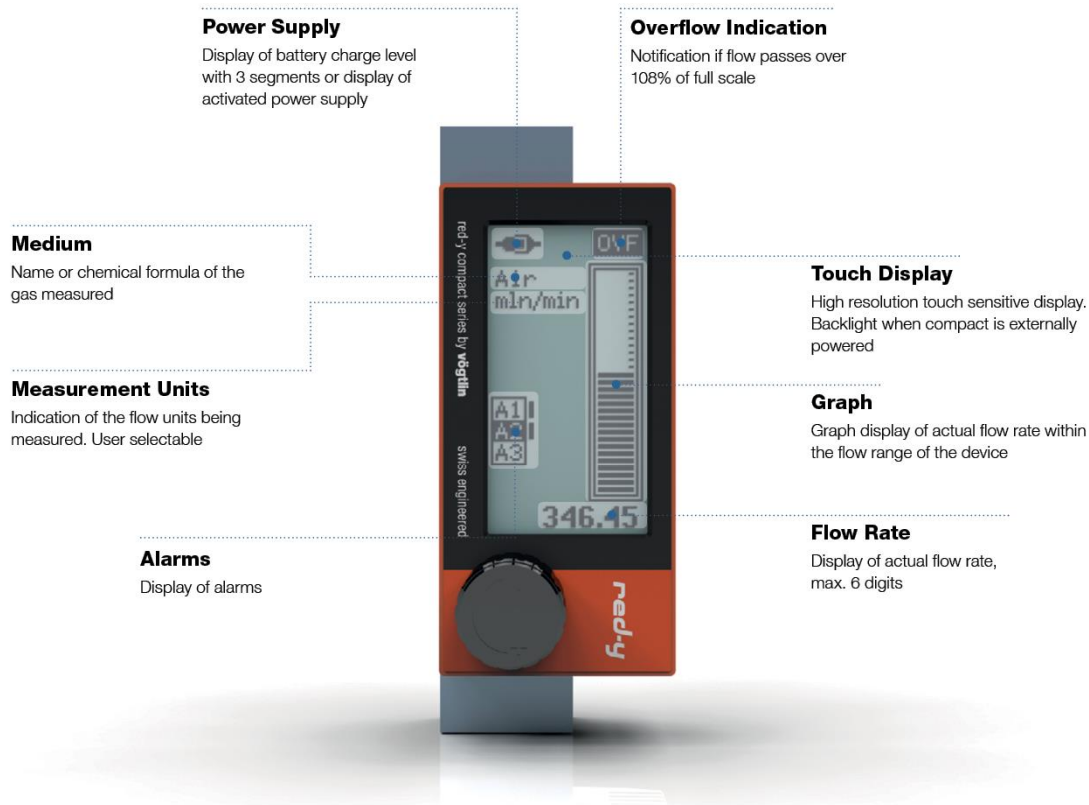


Figure 9 Display main home screen overview vertical

4.10.1. Start-up screen

When the unit starts up, it will show a startup screen for 4 seconds (Screen name: Sensor mode). After this screen you will see the main **home screen** that indicates the primary values. The home screen can be shown in horizontal or vertical mode (see figures 8 and 9)

On the right top you see the battery icon or the symbol for external power. The bar graph represents the current flow graphically. The display also shows the selected gas and the selected measuring units.

Note: If you hold the screen too long during start up, you get into the “service mode”. Hold the display for 6 seconds to leave the service mode. (See chapter [5.12 Firmware upgrade](#))

Note: The display has a vertical and horizontal home mode. The unit will select the mode depending on the position of the flow meter. In chapter [4.12.2.3 Orientation](#) you will learn how to adjust the display position manually. Display flow reading resolution

The red-y compact 2 has the ability to show the actual flow in many different engineering units. This means that the number of digits in the readout can change a lot. In automatic resolution mode the compact 2 calculates the required number of digits depending on the range and selected units. This resolution is however adjustable by the user (See chapter [4.12.4 Resolution](#))

4.10.2. Alarms and notifications on home screens

Flow Rate

If the flow is higher than 108% of the calibrated full scale, the message: “OVF” will be shown in the “Alarms and notification” section in the top of the screen.

If you select an engineering unit for the flow indication that has too many digits to display for the range of the unit, the area where the flow is normally displayed, will show: “Out of range”. Select a different flow unit in section [4.12.3 Units](#)

Totalizer

If the totalized value exceeds the 8 available digits or you selected a totalized unit that exceeds the current totalized flow, the totalizer will show all 9's on it display. (9999999)

You will have to select an engineering unit for the totalizer indication that is big enough to show all totalized flow (for instance m3n or kg). Select a different flow unit in section [4.12.3 Units](#)

Alarm notifications

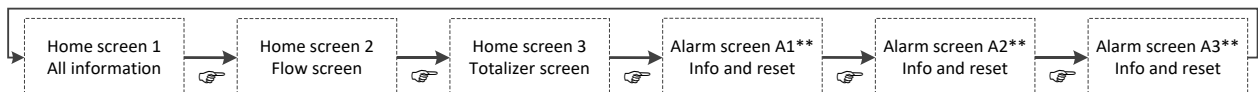
If you make use of the optional alarm module you will see the status on the main screen. More information on the Alarm module see chapter [4.11.2 Alarm Menu](#).

4.10.3. Home screens and Menu access

The *red-y compact* has in horizontal mode the following customer selectable “home screens” (In vertical mode there is only one “home screen”.): These home screens are:

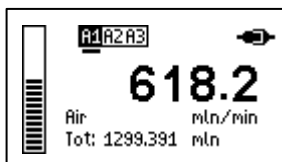
- Overview: Shows flow + flow totalizer + bar graph
- Flow: Shows flow in big digits
- Total: Shows the totalized flow in big digits
- Alarms: Alarm screens 1 to 3 (or notification if no alarm module is connected)

Below more details on these home screens



** only active with alarm module

You can switch between the home screens by touching the screen for less than one second. It is possible to hide screens with the display menu. (See section [4.12.2.1 Home screen](#))



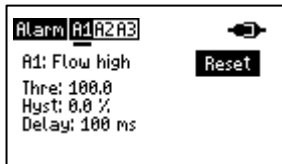
Home screen 1: Screen which shows both the actual flow and the totalizer in smaller digits. The bar graph represents 0-100% of the maximum flow range. The A1, A2 and A3 represent the alarms and only show when you have installed the optional alarm module.



Home screen 2: Screen which shows the actual flow.



Home screen 3: Screen which shows the totalized flow in big digits.

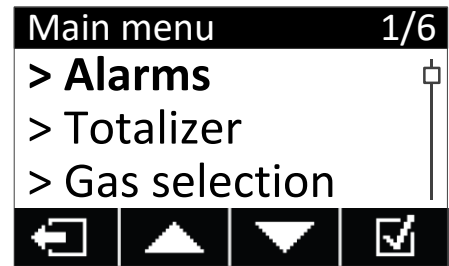


Home screen 4 to 6: Screens dedicated to the individual alarm (Each alarm has its own page. Here you can read the main settings of an alarm. If the alarm is activated you can reset it here if the manual reset is activated. These screens are only relevant if the alarm module is installed.

If you touch any of the home screens longer than one second you will access the **Main Menu**. You will see the screen shown on the right. The menu will always be displayed in horizontal mode.

From this menu you can modify your preferences and access the alarm settings menu.

If you have the password activated, you have to enter your passcode before you have access to the Main menu (See [4.12.6 Security](#)).



4.10.4. Buttons and selection

Each menu has a name (See top inverted bar) and on the upper right you see 2 numbers (example 1/6). The first number shows which item you selected, the second number how many items there are in the menu you selected.

At the bottom of most screens you find the inverted buttons. Meaning of buttons:



Return: Return to the previous menu. If you hold it for longer than 0.5 sec you return to the home screen



Up/down: increase/decrease (you can also select a menu item by touching the relevant line)

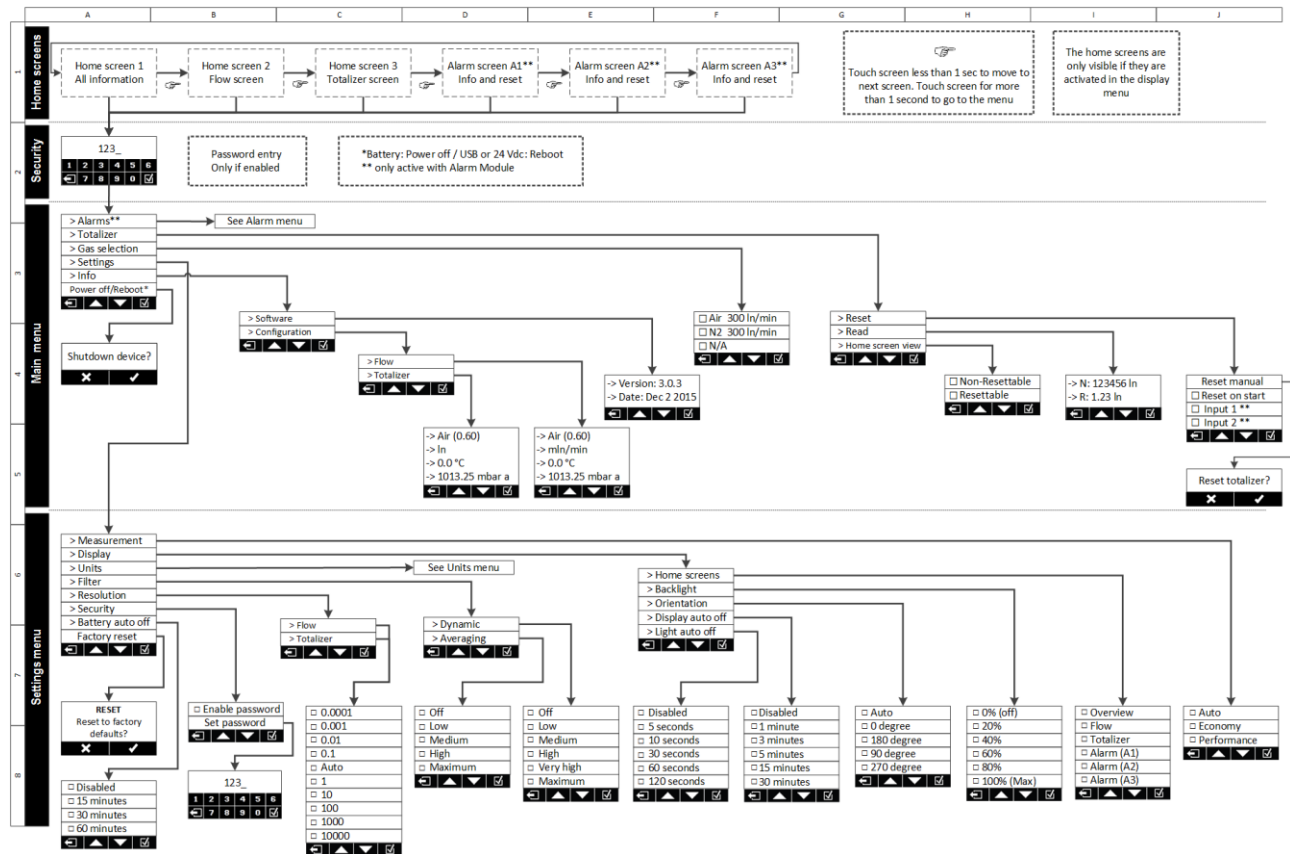


Select/confirm: Store selected value

4.11. Main Menu

NOTE: The menu is only available in horizontal mode

Below is an overview of the main menu structure and a 2 page complete version can be found on the [last pages of this manual](#).



4.11.1. Main Menu

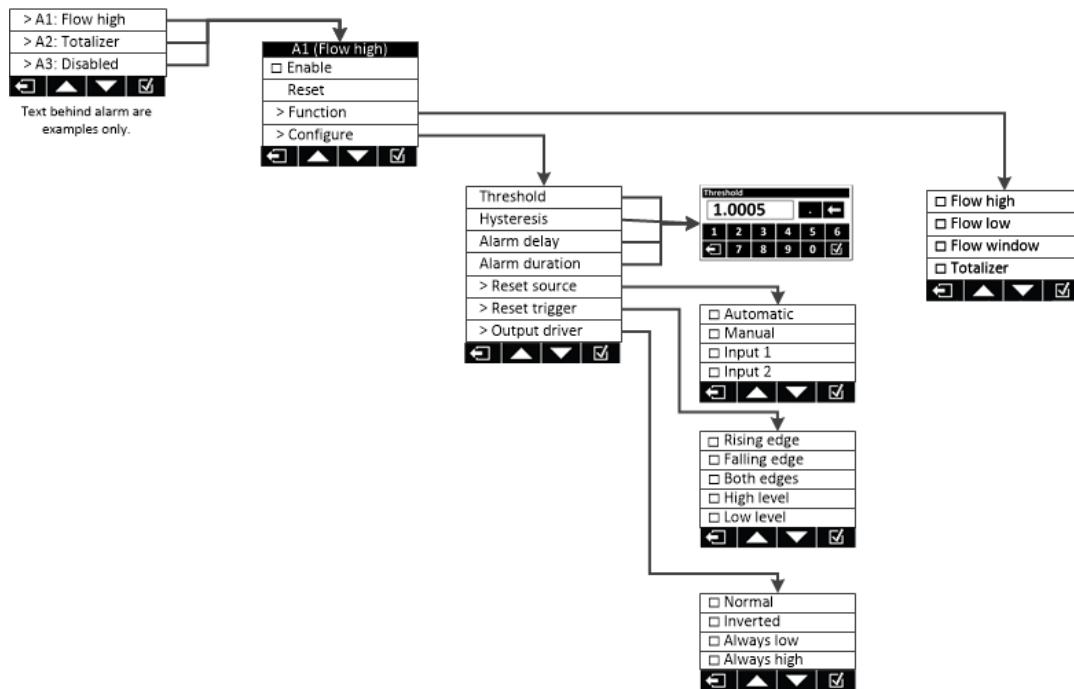
> Alarms**
> Totalizer
> Gas selection
> Settings
> Info
Power off/Reboot*
⏪ ⏩ ⏴ ⏵

In the main menu you have access to the Alarms, totalizer settings, gas selection, settings, information about the status and settings of your unit. If your unit is battery powered, it will give the option “Power off” on the bottom line. If the unit is externally powered it will give you the option to “Reboot” the unit.

** Alarms will be visible but if the Alarm module is not installed this menu option cannot be used.

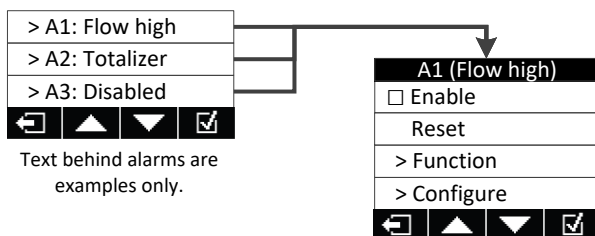
4.11.2. Alarm Menu

If you have installed the optional alarm module and once the alarm function is selected from the main menu, you can select which of the 3 alarms (A1, A2 or A3) you want to configure. Please note that alarm 3 has a different contact type and capacity than alarms 1 and 2 (see diagram in [2.15 Optional Modules](#)). If an alarm has already been configured the primary function is mentioned behind the Alarm (Example A1: flow high).

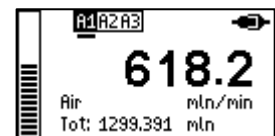


4.11.2.1. Select Alarm Menu

Once you selected A1, A2 or A3, you go into the specific alarm menu. You have the following options:



Enable (Default: disabled): If you activate this, the alarm becomes operational. You can see that an alarm is enabled on any home screen. If an alarm has been enabled the corresponding alarm name is shown underlined (see picture on the right).



Reset: If applicable you can manually reset an alarm here (The other reset location is on the alarm home screen). If the alarm is enabled you see a star (★) behind the word “Reset”.

Function: With this submenu you can set the function of the alarm (Options: Flow high, low or window and totalizer). For more details see next page.

Configure: In this menu item you can set the details of the alarm like its alarm value(s), how the alarm is reset, Alarms delays, hysteresis and more. For more details see next page.

4.11.2.2. Function Alarm Menu

Under the function alarm item you define the functionality of the alarm

<input type="checkbox"/> Flow high
<input type="checkbox"/> Flow low
<input type="checkbox"/> Flow window
<input type="checkbox"/> Totalizer

Flow high (Default): with this function the alarm gets activated if the flow goes over a predefined value set in the threshold by the customer.

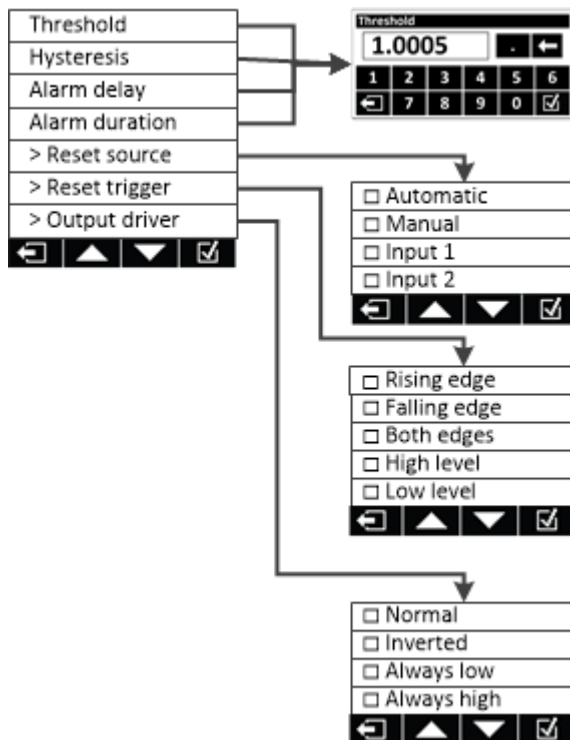
Flow low: with this function the alarm gets activated if the flow is under a predefined value set in the threshold by the customer

Flow window: with this function the alarm gets activated if the flow is outside a “Window” that is predefined by the customer. For example if upper threshold is set to 5 and lower threshold to 4 the alarm will get active if flow is lower than 4 or higher than 5.

Totalizer: The compact has 2 build in totalizer. One is permanent and non-resettable. The second one is a resettable totalizer. You can bring it back to zero (see [4.11.3 Totalizer](#)) The totalizer alarm works with the resettable totalizer. You enter a value in the threshold and once that value is reached the alarm is activated.

4.11.2.3. Configure Alarm Menu

Once you defined the function of an alarm you can define the details of the operation in this menu



Numerical entry screen: If you have to enter numeric values (Like an alarm value (Threshold)) you will see a little keyboard on the screen where you can enter a numerical value.

The decimal point is located behind the number display field. Once you entered a decimal point followed by another number, the dot changes into an “E”. If you press this you can enter the scientific notation, for instance $1.0E-3 = 0.001$ or $2.2E2=220$.

Threshold: Threshold is the activation value. If you for instance selected a high alarm, the alarm will be active when the flow value comes over the Threshold value. The value is entered in flow engineering values that the unit is set for at that moment (for instance in mln/min). If you change the engineering units of the unit in a later stage, the Threshold value will automatically adjust itself to the new flow unit.



Please note that there is no limit to the value you can enter as a threshold. Please double check your entered value.

Hysteresis (Default:

0=OFF): The hysteresis is the difference between the value where the alarm turns ON from turning OFF and the value where it turns OFF from turning ON.

This difference is defined in % of full scale. In figure 10 an example of a 50% threshold value high alarm with a 10% hysteresis. The blue line in the top graph reflects the gas flow, the vertical dotted lines the switching points.

The blue area's in the graph below is where the alarm is activated.

The reset is set to automatic.

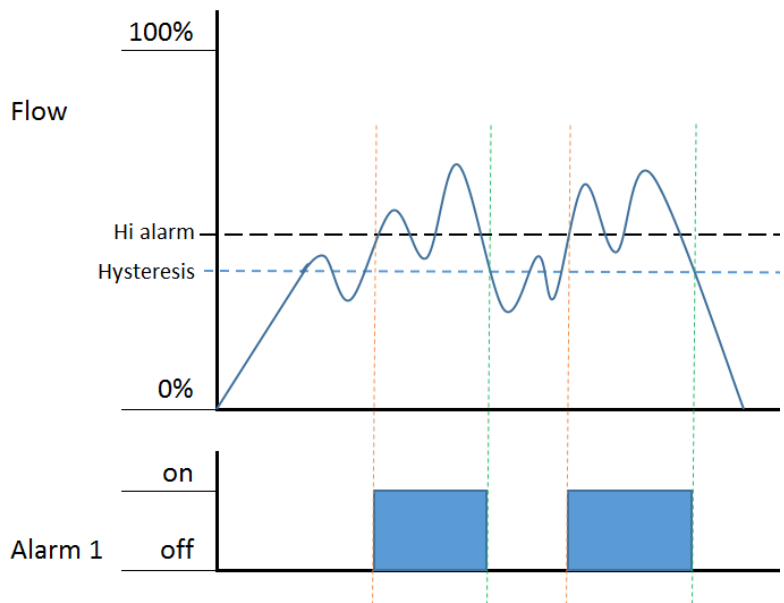


Figure 10: Explanation hysteresis



Please note that you can enter a value of 100% as hysteresis value. If you do that the alarm will no longer switch off.

Alarm delay (Default: 20ms): The alarm delay is a delay in milliseconds between the moment the alarm situation occurs to the moment that the alarm is activated. It can be set from 20 to 9999999 msec (=2.777 hr).

Alarm duration (Default: 500ms): The alarm duration is minimum time that the alarm is active after it is activated. It can be set from 100 to 9999999 msec (=2.777 hr)

Note: This function is only active if the reset is set to automatic.

Reset source (Default: Manual): The alarm can be reset in different ways. Below a list of the 4 possible settings:

Automatic: The alarm is reset the moment the alarm situation is no longer valid. This unless you programmed an alarm duration. For a totalizer alarm this setting will reset the totalizer as soon as the threshold has been exceeded.

Manual: The alarm stays active until you manually reset the alarm through the touch screen of the flow meter.

Input 1: The alarm stays active until you activate input 1

Input 2: The alarm stays active until you activate input 2

Reset trigger (Default: Falling edge): (Note: this function only relates to alarm reset by input 1 or 2).

When you use input 1 or 2 as an alarm reset, you can set exactly on which action the alarm is reset. If for example the input is a manual push button, the rising edge is the moment that you push the button and the falling edge the moment when you let go of the push button.

<input type="checkbox"/> Rising edge
<input type="checkbox"/> Falling edge
<input type="checkbox"/> Both edges
<input type="checkbox"/> High level
<input type="checkbox"/> Low level



Please note that the reset overrides the alarm. Even if the alarm is still valid, if you set this reset trigger to high level, the alarm is ignored until the level becomes low again.

If the blue represents the input being active you can see the different trigger points below.

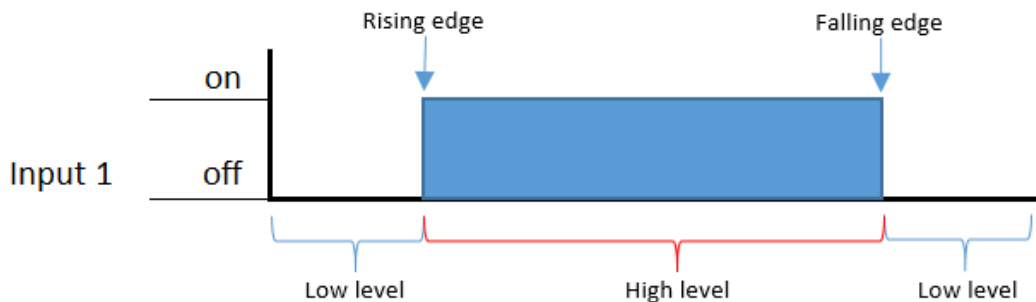


Figure 11: Explanation trigger points

Output driver (Default: Normal): the output driver setting offers the possibility to invert the action from the alarm switch and set the alarm to a predefined state which is convenient for testing systems.

The “Always low” and “Always high” override all alarm settings and flow signals. Please make sure that you take precautions before you use these options in a “life” system.

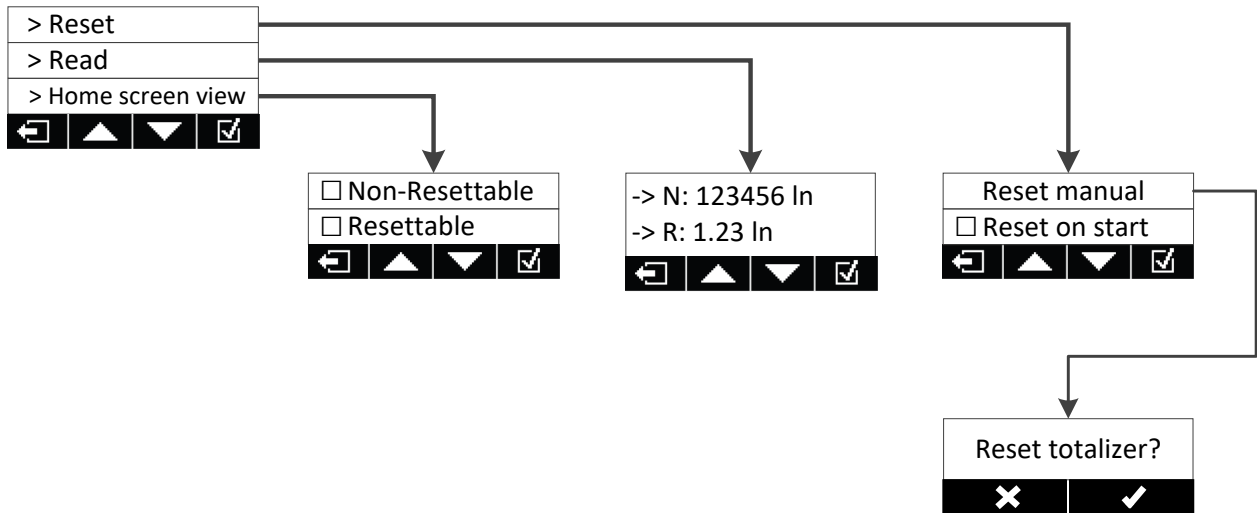
<input type="checkbox"/> Normal
<input type="checkbox"/> Inverted
<input type="checkbox"/> Always low
<input type="checkbox"/> Always high

4.11.3. Totalizer

The totalizer calculates how much gas has totally passed through the flow meter based on the measured flow and the factor time. The instrument has 2 totalizers. Each can display a maximum of 8 digits. The totalizer value will be stored internally as an IEEE 754 floating point number. The internal totalizer will never roll-over, the maximum value far exceeds the lifetime of the instrument. One of the two totalizers is resettable, the other can never be reset and always continues to count for the lifetime of the instrument. Both the totalizer values are stored every 10 minutes in a permanent memory so even if there is no power supply the last stored value will still be kept. If you apply power again the saved value will be restored (Unless you activated the “reset on start” feature).

Please note that if the flow rate exceeds the full scale of the unit (overflow), the totalized value will not be correct. Even if there is an overflow the totalizer operation will continue normally. However since the flow value is limited the totalizer is totalizing the limited flow value only.

If the totalizer value exceeds the possible 8 digit display, you can set the totalizer engineering units to a suitable unit that can display the value within the 8 digits, for instance m³n or kg. See section [4.12.3 Units](#).



Reset: Reset the resettable totalizer to zero

Reset manual: Select this option to manually reset the resettable totalizer

Reset on start: Activate this option if you want that the resettable totalizer is set to zero every time you switch the unit on. *Please note: Upon start-up the totalizer will be silently reset without asking for confirmation. It simply resets the resettable totalizer to zero every time you switch the unit on.*

Remark: With the alarm module it is possible to reset the totalizer with an external remote switch or signal.

Read: Read the totalizers (for instance in-case you only activated the flow screen).

N: is the non-resettable totalizer, R: is the current value of the resettable totalizer.

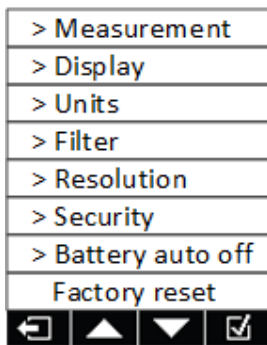
Home screen view: Here you can select if you want to read the Non-resettable or Resettable totalizer on the main screen.

4.11.4. Gas selection

<input type="checkbox"/> Air 300 ln/min
<input type="checkbox"/> N2 300 ln/min
<input type="checkbox"/> N/A
← ▲ ▼ ✓

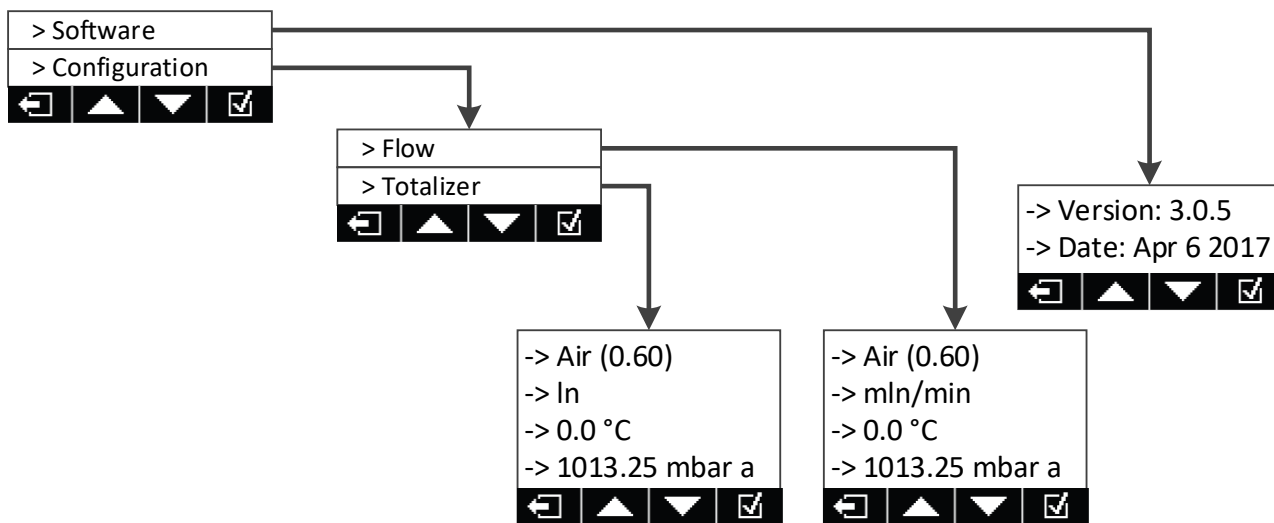
The *red-y compact 2* can store up to 3 different curves for different gases or gas mixtures in its memory. If you have ordered more than one gas when you purchased this unit, you can select the required gas here. The locations that do not have a gas programmed are marked with "N/A". Behind the gas name you see the maximum flow you can measure in your selected units.

4.11.5. Settings



In this menu you can adjust your preferences. See section [4.12 Settings](#) for details.

4.11.6. Info



Info brings you to menu that informs you about the current configuration of the unit. When you select “Software” under the Info menu you can see the current firmware version and the date that this version was released.

Under “Configuration” you see the active settings for the flow and the totalizer. The temperature and pressure refer to the reference conditions for the selected flow units. (See [1.15 Real, Standardized and Normalized flow](#))

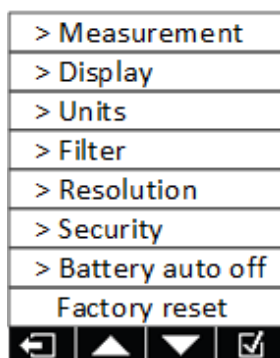
4.11.7. Reboot or Power off



If your unit is battery powered, it will give the option “Power off” in the main menu. You can switch the unit on again by touching the display for 3 seconds.

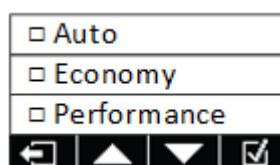
If the unit is externally powered it will give you the option to “Reboot” the unit. “Reboot” restarts the unit. If you select one of these options the unit will ask you to confirm your selection.

4.12. Settings



In the settings menu you can adjust the user variables. See the chapters below for more details.

4.12.1. Measurement



The compact has 2 measurement modes. When you set the measurement to “Auto”:

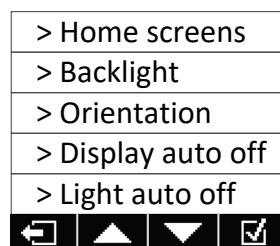
1) When on battery it takes a flow sample every 300 milliseconds and due to that extends the battery life

2) When on external power (24 Vdc or USB) it takes a flow sample every 40 millisecond and due to that will have a faster response and a more accurate totalizer when you have fluctuating flows. With this menu you can force either measurement mode independent of the power source.

Please note that when you set the measurement mode to “Performance” and you use the unit on battery the battery life is limited.

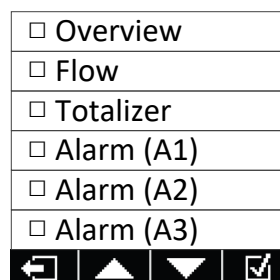
If the measurement setting is forced to “performance” and the unit is operating on the battery, the display shows “PERF”. If the measurement setting is forced to “Economy” and you use an external power supply the display shows “ECO”. Please note that in “ECO” mode the backlight is always off.

4.12.2. Display



In the display menu you can configure the settings for the display. Below you find more details on the individual settings of the display.

4.12.2.1. Home screen



There are 6 different home screens in horizontal mode (one in vertical mode) (See chapter [4.10.3 Home screens](#)) and in this menu you can deactivate up to 5 of the home screens.

Deactivated screens do not show up as a home screen

4.12.2.2. Backlight

<input type="checkbox"/> 0% (off)
<input type="checkbox"/> 20%
<input type="checkbox"/> 40%
<input type="checkbox"/> 60%
<input type="checkbox"/> 80%
<input type="checkbox"/> 100% (Max)

In this menu you can select the brightness of the backlight. The backlight is only available if you use an external power (USB or 24 Vdc).

4.12.2.3. Orientation

<input type="checkbox"/> Auto
<input type="checkbox"/> 0 degree
<input type="checkbox"/> 180 degree
<input type="checkbox"/> 90 degree
<input type="checkbox"/> 270 degree

The screen can be orientated (turned) in the most convenient position for reading (upside down or vertical). If this menu is set to Auto, the unit will do this automatically. A sensor determines it's orientation. The sensor can be overridden with the 0, 90, 180 or 270 degrees settings. This is very convenient if you want the gas inlet to be on the right side of the flow meter or place the meter vertical. Note: The menu can only be displayed in horizontal mode and the vertical screen mode has only one "Home screen".

Remark: at installation make sure you respect the flow direction of the gas indicated by an arrow on the rear of the instrument.

4.12.2.4. Display auto off

<input type="checkbox"/> Disabled
<input type="checkbox"/> 1 minute
<input type="checkbox"/> 3 minutes
<input type="checkbox"/> 5 minutes
<input type="checkbox"/> 15 minutes
<input type="checkbox"/> 30 minutes

The display can be set to switch off after a defined time following your last touch event. If you set the "Display auto off" to "Disabled", the display stays on till the power is switched off. When the display is switched off, the backlight will also switch off. The totalizer is still working. You can activate the display again by touching it.

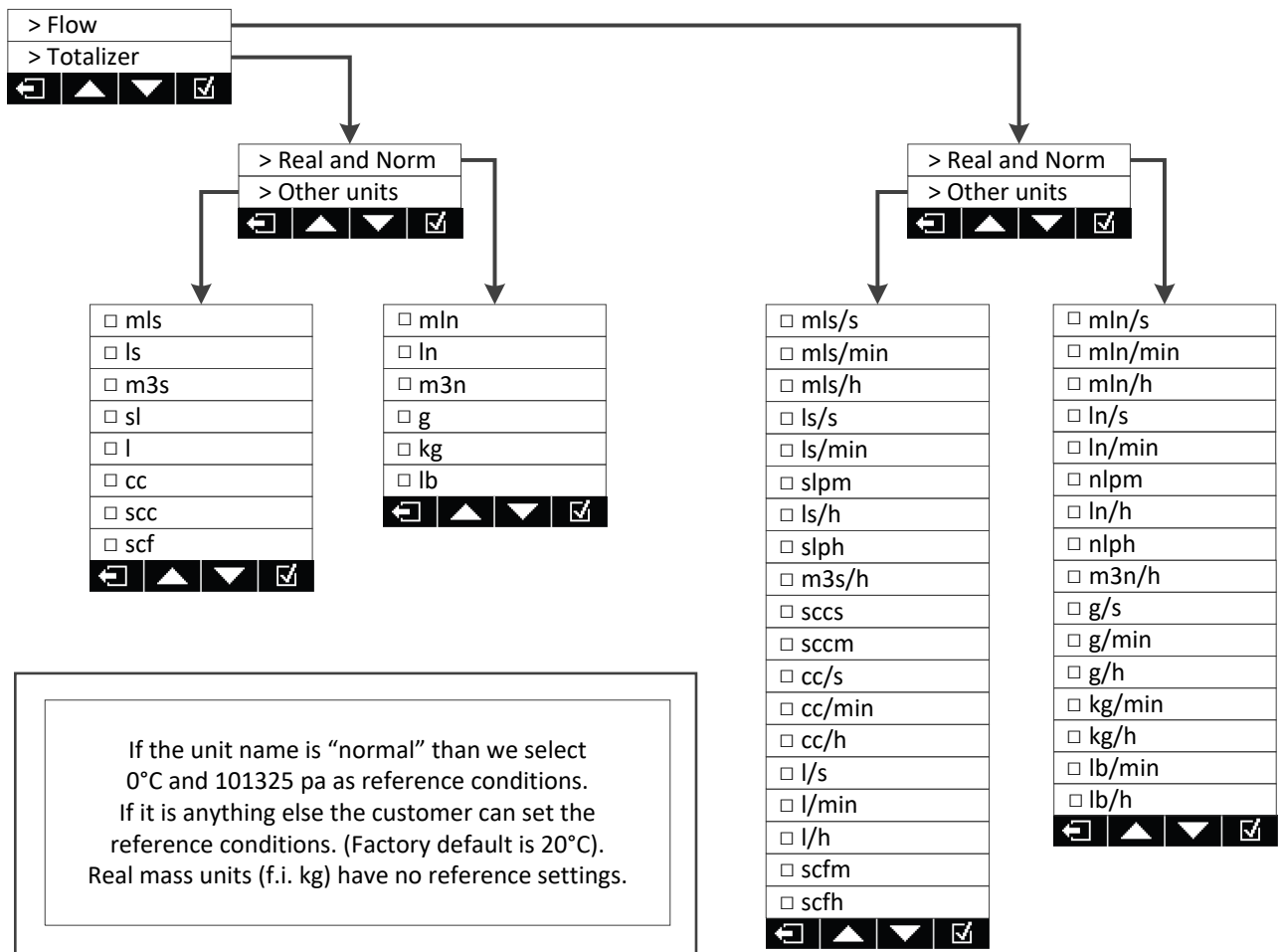
4.12.2.5. Light auto off

<input type="checkbox"/> Disabled
<input type="checkbox"/> 5 seconds
<input type="checkbox"/> 10 seconds
<input type="checkbox"/> 30 seconds
<input type="checkbox"/> 60 seconds
<input type="checkbox"/> 120 seconds

In this menu you can define a time before the backlight automatically switches off (after the last touch event). The backlight goes on again when you touch the display. When the setting is "Disabled" the light is continuously on.

When the backlight is switched off you can still read the display. The backlight only works if there is an external power connected. On battery power supply or in ECO mode the backlight is not operational.

4.12.3. Units



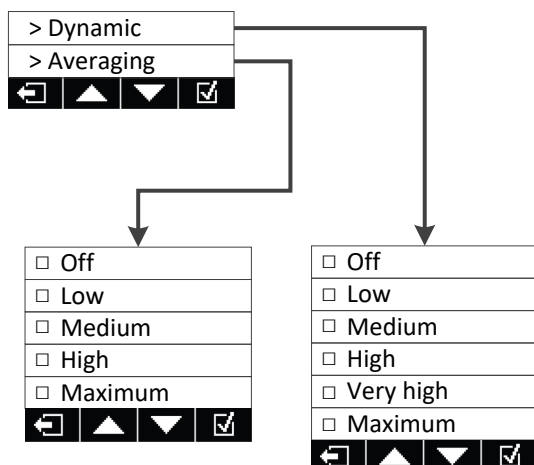
In the *Units* menu you can set the required engineering units for the totalizer and the flow indication. If there is a unit selected with too many digits, the device will show: “Out of range” on the display.

If you select a totalizer unit that would create too many digits the totalizer will show 9999999.

More information in section [4.10.2 Alarms and notifications on homescreens](#).

For more information on “normal” and “standard” flow units see chapter [1.15 Real, Standardized and Normalized flow](#) of this manual.

4.12.4. Filter



With the filter settings you adjust the reading of quickly changing flows. The filter basically averages the readings from the sensor. More information can be found in chapter [2.22 Filter Settings](#).

There are two separate filters that are adjustable and independent of each other.

Dynamic and Averaging filter:


Dynamic Filter:

The dynamic filter will increase the number of readings that are averaged when the flow is less dynamic and decrease the number of readings that are averaged

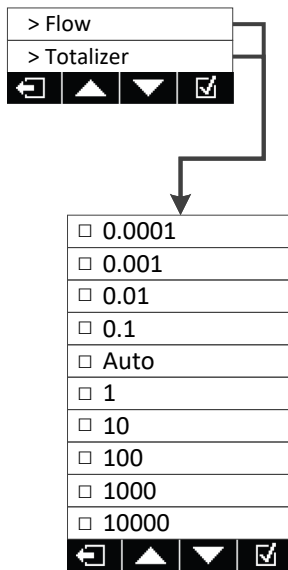
when the flow shows quick changes. So when the flow is quickly rising or falling it will take less averages in its calculations. On this way the unit will react faster to changes in the flow.

Averaging filter:

The averaging filter is a “moving average filter”. It calculates the average value of a number of measurements and shows the average on the display. As you increase the filter setting from off to maximum, you increase the number of measurements the average is calculated from.

 Before you apply higher filter values, please try to identify the cause of the flow pulsations. This could be a compressor, pressure amplifiers, incorrectly sized fittings, non-return valves or pressure regulators. Sometimes creating more “dead volume” before or behind your flow meter could solve the problem.

4.12.5. Resolution



In this menu you can adjust the resolution of your flow and totalizer values shown on the display.

The red-y compact 2 has the ability to show the actual flow and the totalizer in many different engineering units. This means that the number of digits in the readout can change a lot. In automatic resolution mode (menu option "Auto") the number of digits are computed depending on range and current selected unit.

The minimum number of digits is 4, the maximum 6 (Excluding the decimal point). Below you find the table on how many digits will be visible in this auto mode.

Range		Examples display values		Display resolution
from	until	from	until	
0.01	0.09	0.01	0.09999	0.00001
0.1	0.9	0.1	0.9999	0.0001
1	9	1	9.999	0.001
10	99	10	99.99	0.01
100	999	100	999.9	0.1
1000	9999	1000	9999	1
10'000	99'999	10'000	99'990	10
100'000	999'999	100'000	999'900	100

Notes:

1. Because the value is right-aligned, it is possible that depending on the actual flow you can see a change in the number of digits behind the decimal point. For example if the flow is changing from 2 to 2.01 and then 2.1 you can see: 2.0, 2.01 and 2.1 on the display.
2. If the maximum number of digits is exceeded you see out of range on the display. In that case select another unit (see chapter [4.12.3 Units](#)).
3. The step size in auto mode between each reading is depending on the range but it is always well within the accuracy of the flow meter. For other setting mentioned below, this does not have to be the case.

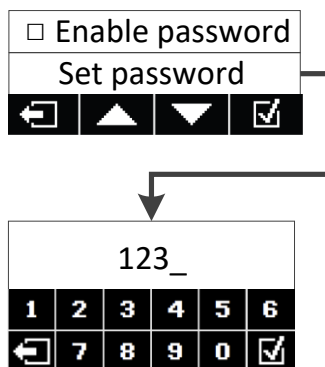
The other settings are the minimum step that the value will take between values.

Example: If you have a flow of 189.673 mln/min than the unit will show 189.6 in auto mode. When selecting the other settings you would see:

Resolution setting	Flow	Displayed	Remarks
0.0001	189.673	189.673	The display cannot show more than 6 digits
0.001		189.673	
0.01		189.67	
0.1		189.6	
auto		189.6	
1		189	
10		180	
100		100	
1000		0.0	
10000		0.0	

Note: The numbers are not rounded off, but they are made invisible (also called a floor function) The totalizer and the bar graph will not be effected by this setting and will also work based on the real high resolution flow.

4.12.6. Security



To avoid the unauthorized changing of settings in the menu, it is possible to protect the menu with a self-defined password. If you enable this option you first have to enter a 4-digit numeric password to gain access to the menus. In this setting you can also define that password. You can only activate the password after you have defined your own personal password under “Set password”

If you forget or lose your password, please contact the factory at: service@voegtlin.com

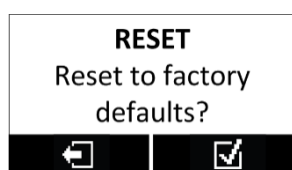
4.12.7. Battery auto off



To extend the battery life to the maximum we recommend that you set this menu so that, when powered with a battery, the *red-y compact 2* will switch off automatically after the indicated number of minutes. Please note that this menu has no effect if the unit is powered by USB or the external 24 Vdc. **Once the unit is switched off it no longer totalizes the flow.**

Note: When we supply the unit, the “auto power off” will be set to 15 minutes

4.12.8. Factory reset



If you activate the factory reset, all variables will be reset to the factory default (for instance the password protection will be disabled). The continuous totalizer, however, keeps its value. Only the resettable totalizer gets reset to zero. The reset takes about 30 seconds.

5. Maintenance

When operated properly and with the use of clean and dry gas, *red-y compact* devices do not require any routine maintenance. There are no internal moving parts in the measurement part of the device. However, we recommend that the calibration is checked after 12 months. If your *red-y compact* is still within tolerance, this time interval can be extended. The timing of the periodic check is the customer's responsibility.

5.10. Cleaning to remove contamination

Depending on the type of contamination, on-site cleaning of the measuring or control device may be possible. As a first step, we recommend flushing with N₂ or dry air. If it is contaminated with liquids (ex. oil), pure methanol alcohol (100%) can be used. After cleaning, rinse the *red-y compact* with the optional needle valve position fully open with dry air or nitrogen for approximately 15 minutes to dry out all liquids.

Notes:



- ⇒ **The warranty is null and void if the housing was removed.** Only use the proper tools.
- ⇒ Be careful when handling the device and the individual components.
- ⇒ Make sure that the disassembly environment is clean.
- ⇒ Do not touch the circuit board or electronic components without first grounding yourself and the surroundings. Electrostatic discharges can destroy components.
- ⇒ After cleaning, you should have the device checked or, if necessary, recalibrated by your sales partner at the next opportunity.

Flow splitter disassembly



Before you carry out any mechanical work on the unit the gas supply must be disconnected, any pressure relieved and the all power disconnected/removed.

If the basic body has become contaminated, the flow splitter can be removed. The removal should only be done by trained service personnel. Removal and Assembly can potentially shift the calibration of a unit. Disassembly is different for the different device types:

Note: The fourth letter of the article code defines the type of the flow splitter. For example: GCM-B9EA-BB20 contains a flow splitter of the type B.

Type A

- ⇒ First release the slotted screw in the center of the flow splitter (Left tread, approx. 5 turns)
- ⇒ Unscrew the whole flow splitter with a hex key

Type B, C

- ⇒ Unscrew the whole flow splitter with a hex key

Type D (G 1/2“)

- ⇒ First unscrew the locking pin (underside of the body) with a hex key
- ⇒ Unscrew the flow straightener with a suitable tool
- ⇒ Pull the flow splitter out of the body

Flow splitter assembly

- ⇒ Carry out the steps described above in reverse order
- ⇒ After correct assembly flush *red-y* with dry inert gas.
- ⇒ Check that the cleaned measuring device is functioning correctly by checking the zero point and some defined measurement values.

Recalibration

It is mandatory to recalibrate the instrument after replacing the flow splitter.

5.11. Returns

When returning a *red-y compact* please insure suitable packaging. Please contact us before you return the unit to us. To repair the unit we require a detailed and accurate description of the problem, the required service and the possible causes of the faults. You can contact us at: USA: service@voegtlinusa.com, Asia: service@voegtlin.cn, Rest of the world: service@voegtlin.com



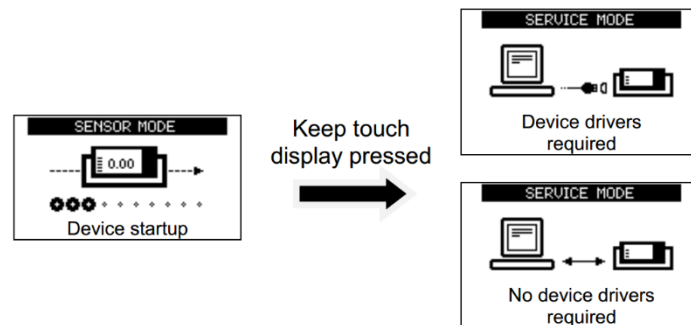
Note:

If the device has come into contact with aggressive or toxic gases, please ensure that it is properly cleaned/flushed before returning the device to us. Please always complete the contamination declaration form. You will find these in the appendix or in the enclosed CD and in this manual, see section [6.18 Contamination Statement](#).

5.12. Firmware upgrade

Vogtlin continues to improve and add features to the firmware of this instrument. Firmware updates are available free of charge on our website www.voegtlin.com. Register as user on our website to get notified on any future firmware updates.

- 1) Download and install the Vogtlin Service Tool on your windows PC
- 2) Remove the battery or any connected module from your red-y compact 2
- 3) Start the compact 2 in service mode while it is connected to your computer with the USB cable. To enter service mode, restart (or power up) the instrument and keep the touch display pressed for about 4 seconds while the startup screen is showing (see picture below).
- 4) If after the 4 seconds you see the screen with the plug between the icons, refer to the Service tool manual how to install the required driver. If you see arrows, continue with 5)



- 5) Start the service tool software and follow the instructions

Do not disconnect USB cable during the firmware update. Once the firmware update is finished, the instrument automatically restarts using the updated firmware.

To leave service mode without performing a firmware update, keep the touch display pressed for about 6 seconds. This will power-off (on battery supply) or restart (on cable power supply) the instrument without replacing its current firmware. The update will not influence your settings

Note:



Please read the manual supplied in the upgrade package service tool. You will find the link to the extended version of the upgrade manual in the menu bar once you installed and started the software.

6. Appendix

6.10. Troubleshooting

In the following table we have compiled fault symptoms, their possible causes and suitable measures you can take. If you do not recognize your fault symptom, or the proposed measures were not successful, please consult your sales partner.

If you are planning to return a product, please refer to the chapter [5.11 Returns](#).

If you have to remove the measuring or control device from the pipeline, please observe any flushing procedures and the relevant safety guidelines. You will find a guide on how to remove and clean the devices in the chapter 'Operation and Maintenance'.

Error	Possible causes	Measures
Output indicates high flow continuously	Flow is too high (Overflow)	Reduce the flow rate. If necessary, the full scale can be extended. Please consult your sales partner
	Device is heavily contaminated	Please consult your sales partner
	Sensor faulty	Please consult your sales partner
Flow is shown despite zero flow.	Sensor contaminated	Please consult your sales partner
	The device is being operated with a different gas from its calibration.	For multi-gas instruments, you can set the appropriate gas type
	Offset due to mounting position	Particularly with small measurement ranges, heavy gases and gauge pressures > 5 bar, a zero-point offset can occur where the mounting position is vertical >> chimney effect. Where possible, mount the device horizontally
The manual valve is leaking	Contaminated valve	Flush the valve repeatedly with clean dry nitrogen
Meter does not indicate the expected value.	Leakage	Flow rate > than reference: Leakage between measuring device and your reference Flow rate < than reference: Leakage upstream of the measuring instrument
	Contamination	With contamination by sealing tape, for example, it is possible that the flow divider is partially blocked. In this case the device displays more than the reference. Please consult your sales partner
	The device is being operated with a different gas than calibrated.	Connect the intended gas, or change the type of gas in the 'Calibration' menu
	Different reference conditions	Verify "Normal" or "Standard" conditions
	Inlet pressure is too low	Check your inlet and outlet pressures
	Pressure drop too high	Check for blockage or pollution. Check fittings ID

Error	Possible causes	Measures
Unit, backlight or display unexpectedly switched off	Battery empty	Replace battery
	Menu settings incorrect	Adjust the auto off menu's
Unit always enters service mode when switched on	Firmware damaged	Perform a firmware upgrade as described in this manual. If the problem remains please consult your sales partner.
Out of Range	Wrong unit selection	Select a unit that fits better to the current flow.
Forgot Password	Contact the factory or distributor	Please consult your sales partner
Totalizer shows 9999999	Overflow totalizer units	Select a different unit (try m3n or kg)
Disfunction alarm contacts	An external magnet can unintentionally influence the alarm contacts	Please remove the interfering magnet

If you need any support please contact us by e-mail to Customer Service: service@voegtlin.com

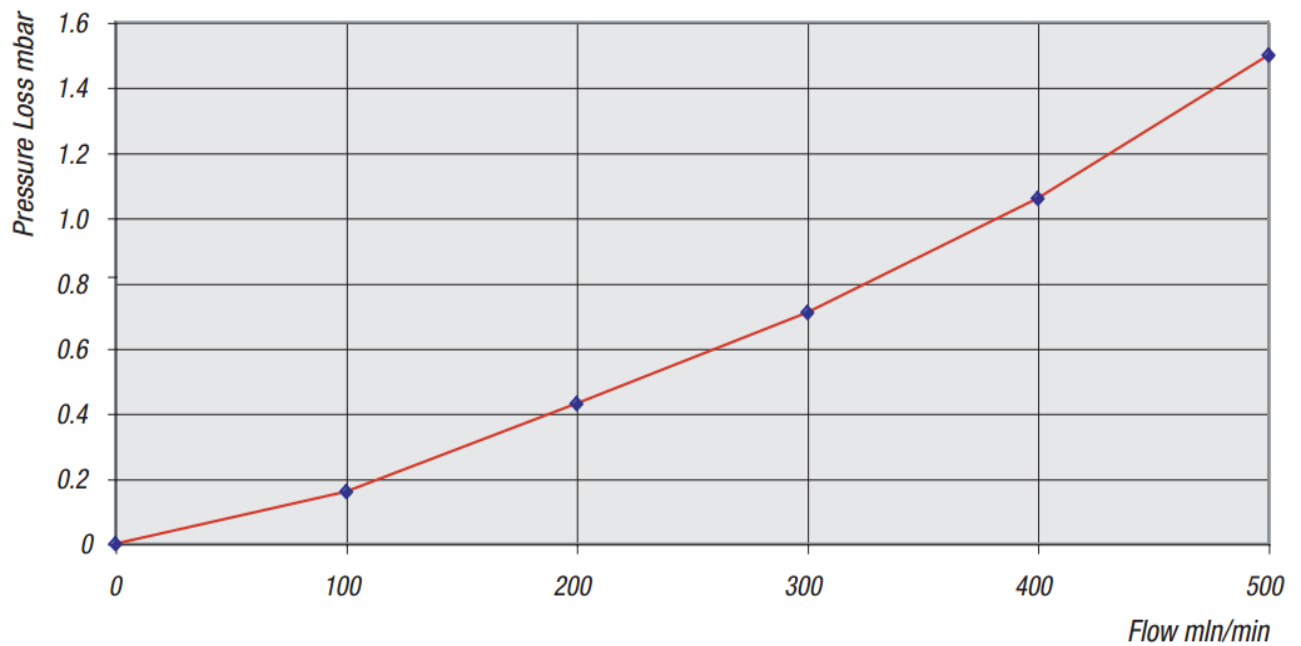
6.11. Pressure loss

The following figures show examples of the pressure drop of a *red-y compact* (measuring instrument only, not the valve)

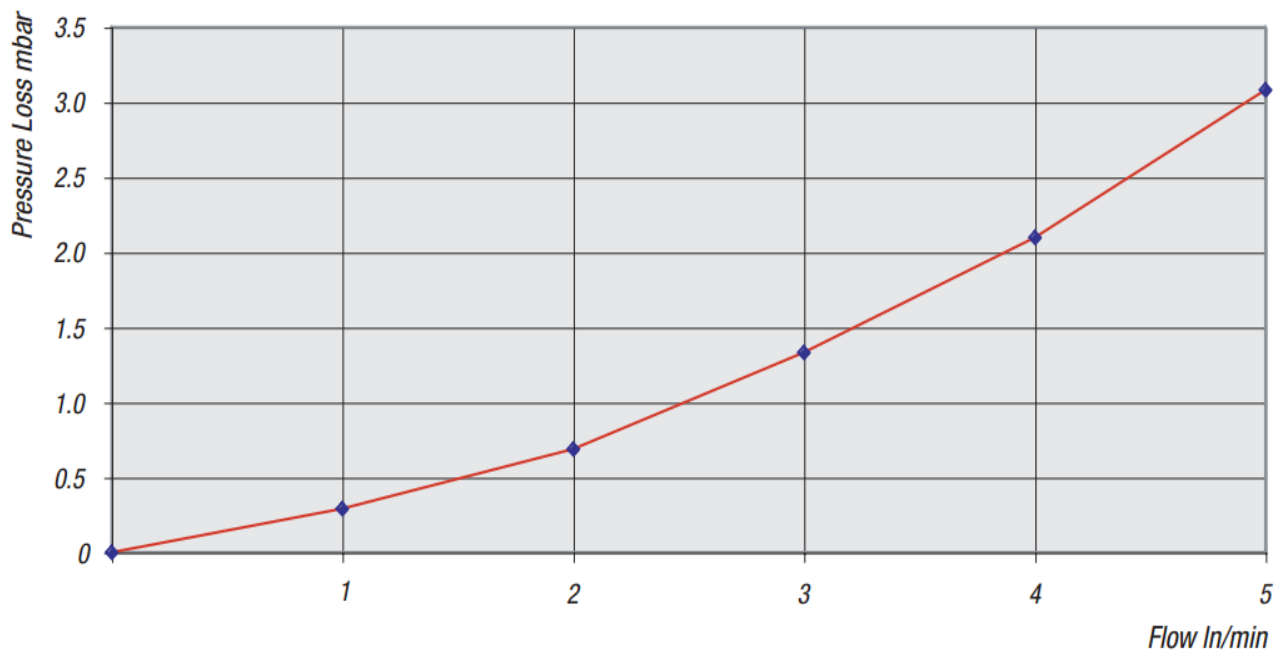
Please note that the curves below are as an indicator only and based on atmospheric outlet pressure. Especially when the outlet is under vacuum, the pressure drop can be higher.

Heavier gasses like Argon will create more pressure drop, lighter gasses like helium will create less pressure drop.

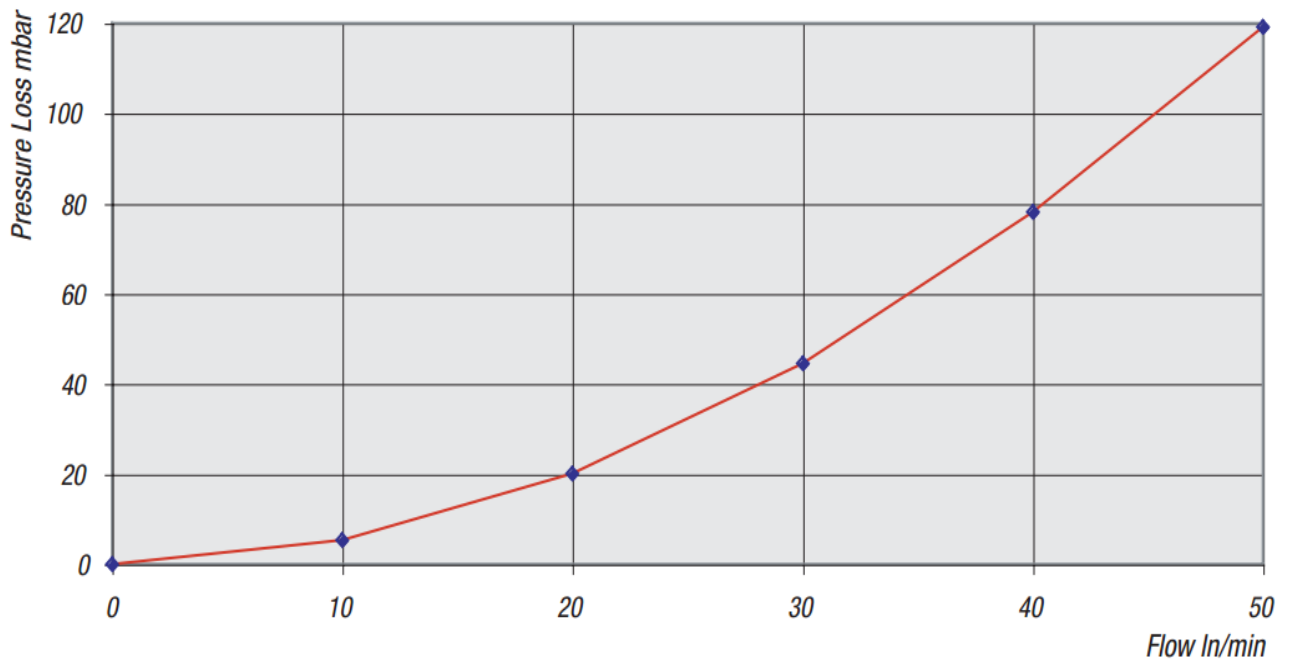
Pressure Loss 500 mln/min (Air)



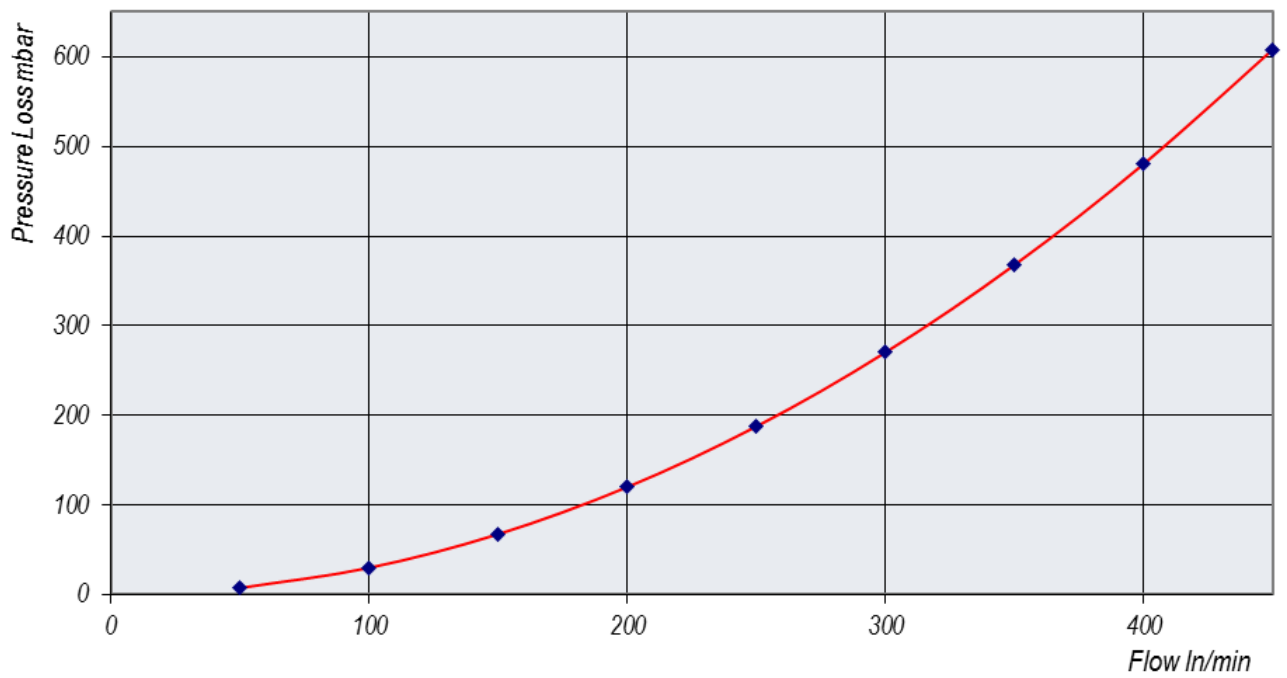
Pressure Loss 5 ln/min (Air)



Pressure Loss 50 l/min (Air)

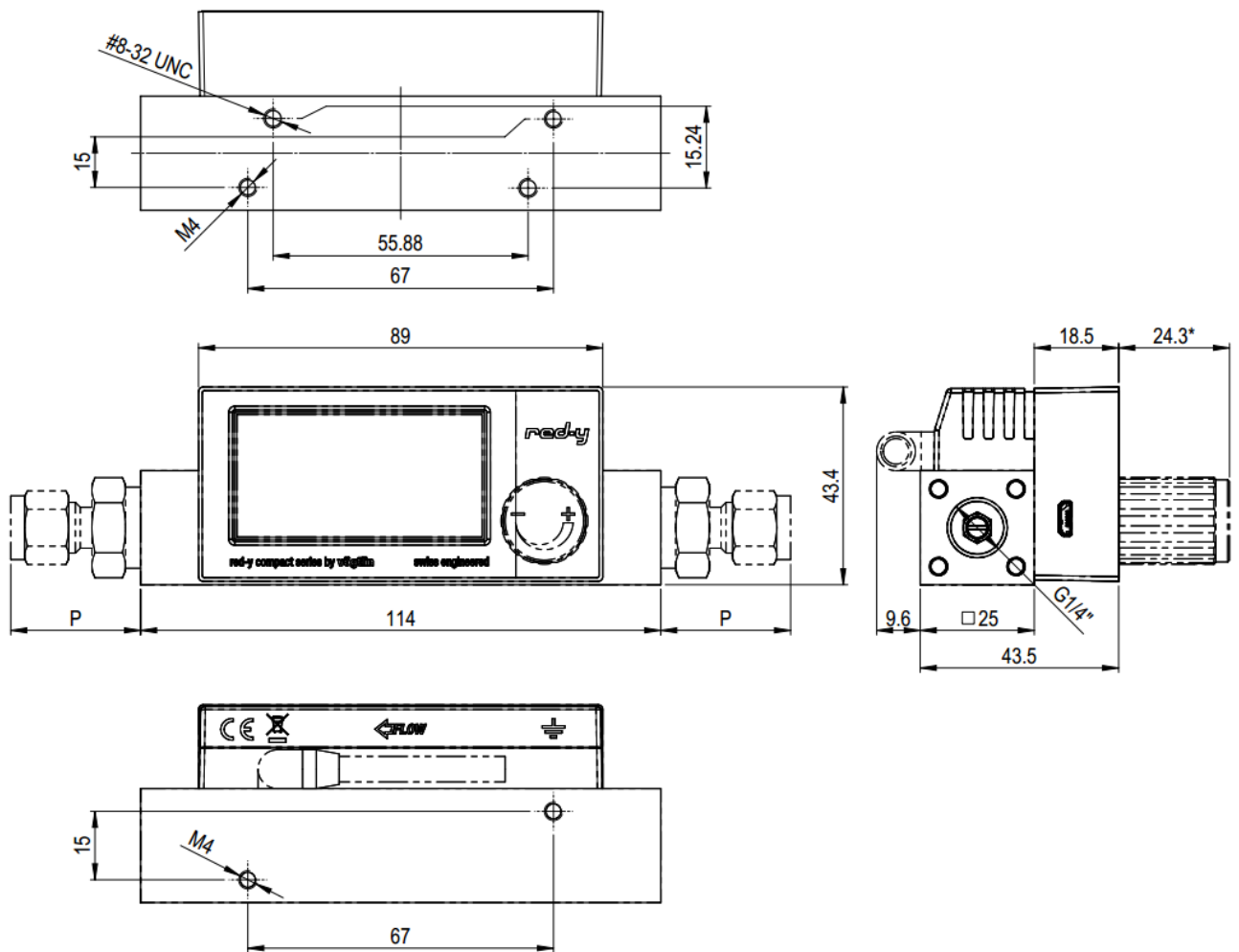


Pressure loss 450 l/min (Air)



6.12. Dimensional drawings 1/4" in mm

GCx-A/B/C: (Units with 1/4" BSPP process connections)



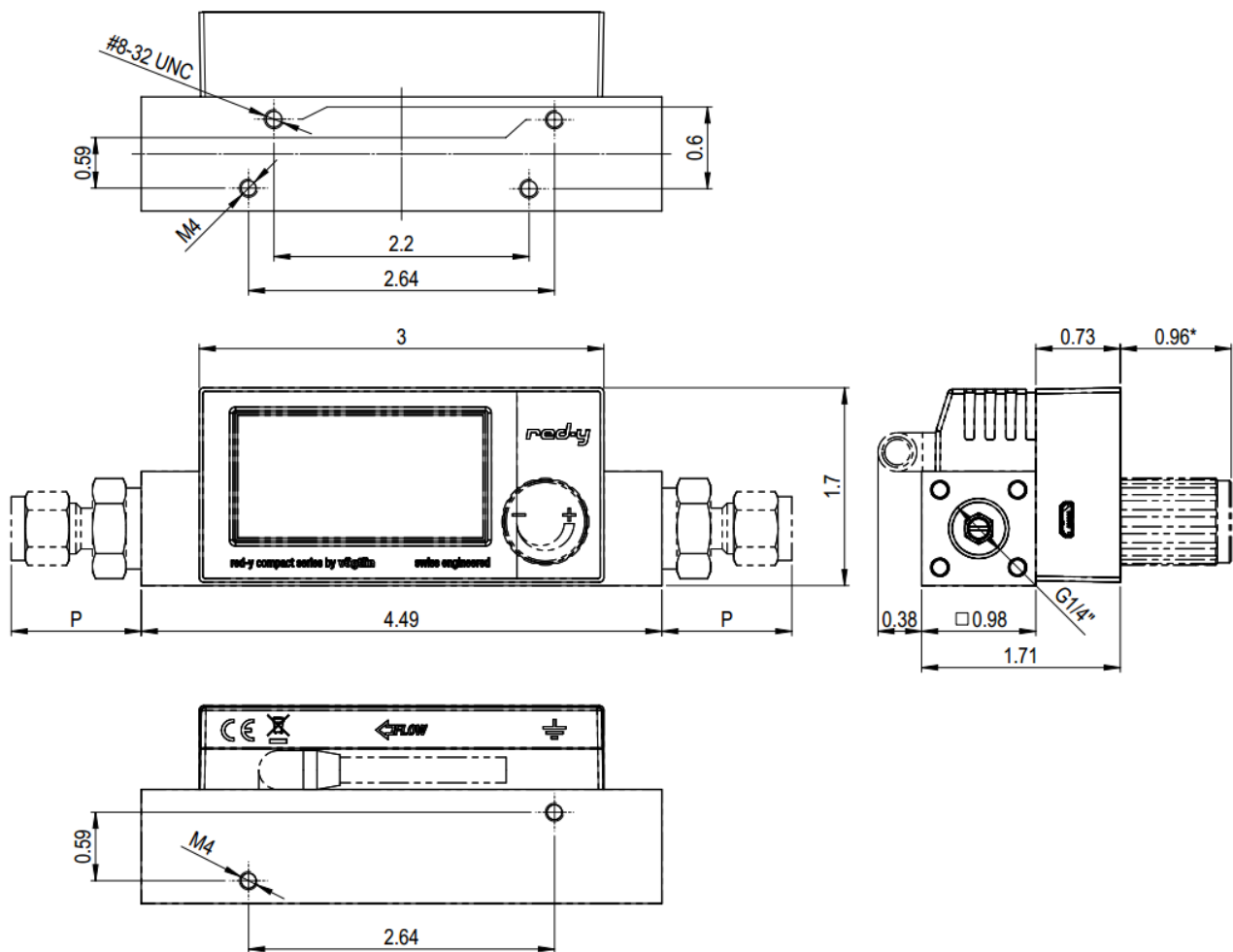
“P” refers to the optional fittings length. Fittings are options only. Standard process connection is female 1/4" BSPP tread.

You can find detailed information as well as 3D models for the individual products on our homepage www.voegtlin.com

If additional information is needed, please consult your sales partner. The contact list for our distributors can be found on our website.

6.13. Dimensional drawings 1/4" in inches

GCx-A/B/C: (Units with 1/4" BSPP process connections)



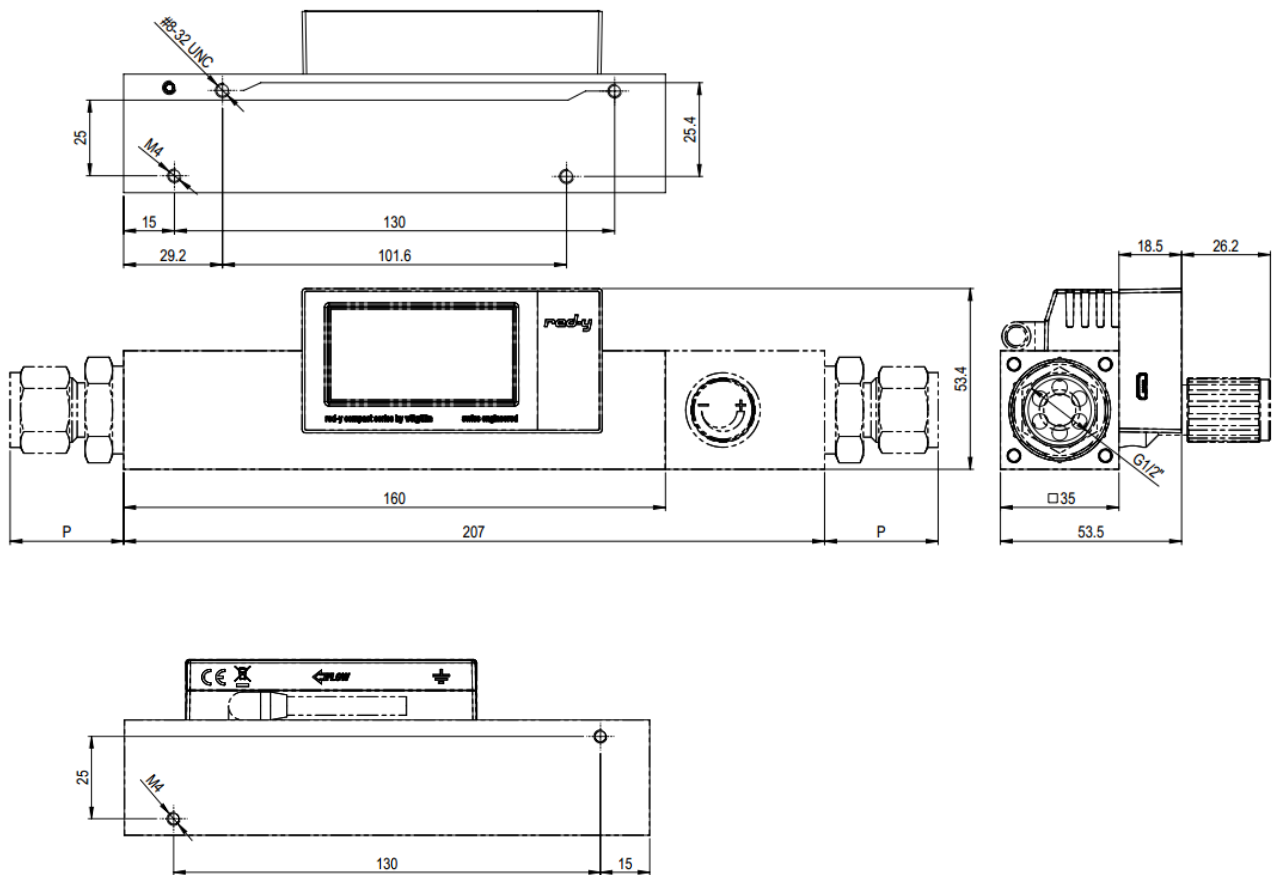
"P" refers to the optional fittings length. Fittings are options only. Standard process connection is female 1/4" BSPP tread.

You can find detailed information as well as 3D models for the individual products on our homepage www.voegtlin.com

If additional information is needed, please consult your sales partner. The contact list for our distributors can be found on our website.

6.14. Dimensional drawings 1/2" in mm

GCx-D: (Units with 1/2" BSPP process connections)



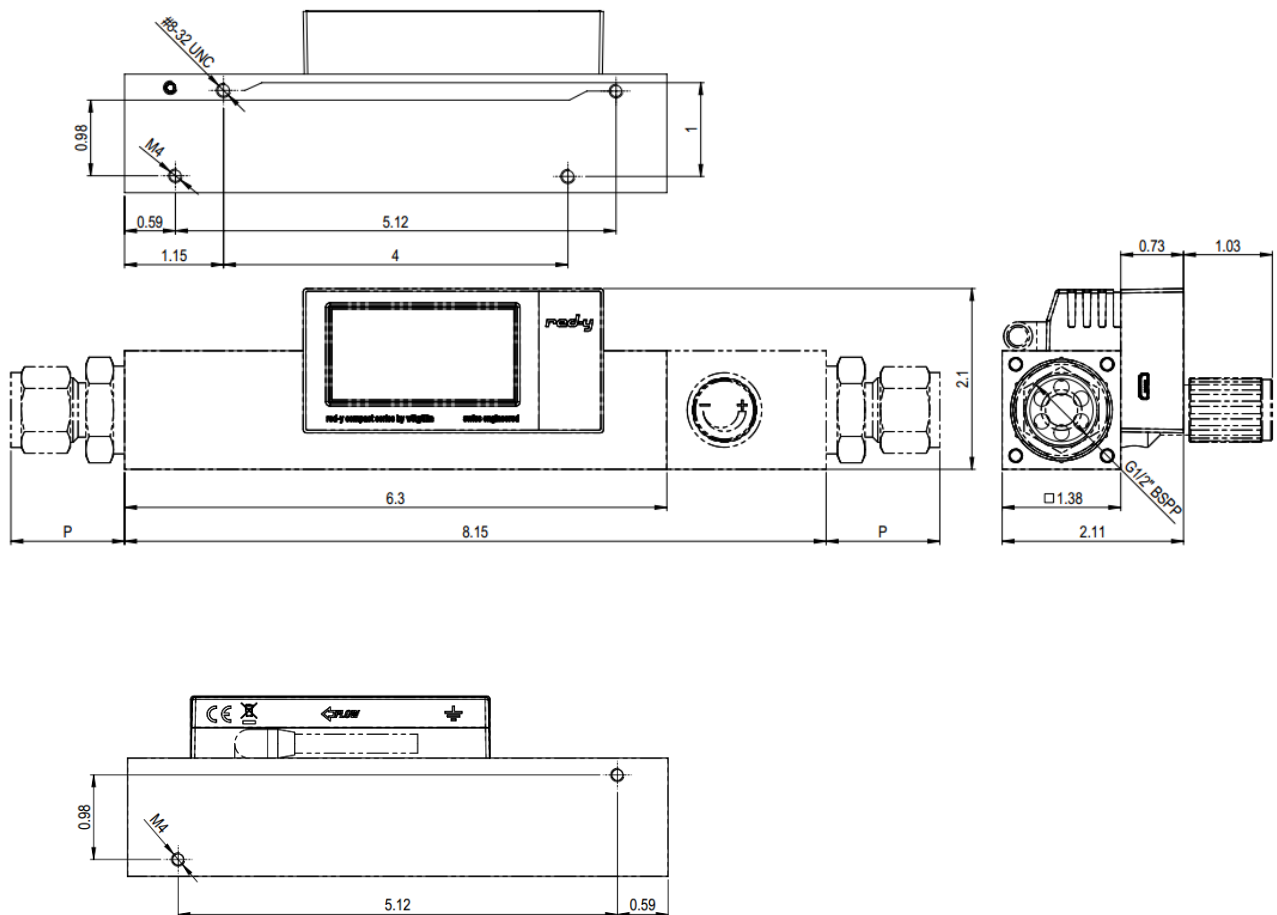
“P” refers to the optional fittings length. Fittings are options only. Standard process connection is female 1/2" BSPP tread.

You can find detailed information as well as 3D models for the individual products on our homepage www.voegtlin.com.

If additional information is needed, please consult your sales partner. The contact list for our distributors can be found on our website.

6.15. Dimensional drawings 1/2" in inches

GCx-D: (Units with 1/2" BSPP process connections)



"P" refers to the optional fittings length. Fittings are options only. Standard process connection is female 1/2" BSPP tread.

You can find detailed information as well as 3D models for the individual products on our homepage www.voegtlin.com.

If additional information is needed, please consult your sales partner. The contact list for our distributors can be found on our website.

6.17. Wetted parts red-y compact 2 series

Instrument Gerät	red-y compact 2 series
Body <i>Grundkörper</i>	1.4404 (316L) or aluminium
Body: O-Rings <i>Grundkörper: O-Ringe</i>	FKM (Standard), EPDM (option)
Flow divider <i>Strömungsteiler</i>	1.4305
Control valve <i>Regelventil</i>	1.4305/1.4105/1.6908
Control valve: O-Rings <i>Regelventil: O-Ringe</i>	FKM (Standard), EPDM (option)
Sensor material <i>Sensormaterialien</i>	Silicon, silicon oxide, silicon nitride <i>Silizium, Siliziumoxid, Siliziumnitrit</i> Epoxy
Sensor packaging	1.4305

Abbreviation Kurzbezeichnung	Designation Bezeichnung	Remarks Bemerkungen
EPDM	–	Ethylene-propylene-diene-monomer rubber Ethylen-Propylen-Dien-Kautschuk
Epoxy	–	Adhesive for sensor fixation, protection for wire bonding Klebstoff für Sensorfixierung, Schutz für Bonddrähte
FKM	–	Fluor rubber Fluor-Kautschuk

For units with EPDM O-rings it is possible to get a FDA compatible materials statement. Please contact the factory or your local distributor for additional information.

6.18. Contamination statement

When returning equipment to us, please complete all sections of the following declaration. In particular, the reason for return, in the case of contamination the nature of the residues and the cleaning, as well as information on any possible hazards. Include this with shipment.	
Device(s)	
Model code:	
Serial number(s):	
Reason for return:	
Type of contamination	
Device was in contact with:	
It was cleaned by us with:	
To protect our employees and for general safety during transport, it is vital to clean devices properly and to use appropriate packaging.	
Can you provide further information on the contamination?	Inert (no hazard) Corrosive Caustic/acid Must not come into contact with moisture Oxidizing Toxic Other hazards: _____
Legally binding declaration	
We hereby confirm the correctness and completeness of the above information.	
Company:	
Address:	
Phone:	
Contact person:	
e-mail address:	
Date:	
Signature:	

6.19. Overview Default settings

No.	Group	Subgroup	Name	Options	Default	Remarks
1	Totalizer		Home screen view	Non- Resettable Resettable	<input type="checkbox"/> <input checked="" type="checkbox"/>	
2	Gas selection			Gas 1 Gas 2 Gas 3	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	1)
3	Settings	Measurement		Auto Economy Performance	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
4	Settings	Display	Home screens (multiple choice)	Overview Flow Totalizer Alarm (A1) Alarm (A2) Alarm (A3)	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
5	Settings	Display	Backlight	0% (Off) 20% 40% 60% 80% 100% (Max)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
6	Settings	Display	Orientation	Auto 0 degree 90 degree 180 degree 270 degree	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
7	Settings	Display	Display auto off	Disabled 1 minute 3 minutes 5 minutes 15 minutes 30 minutes	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
8	Settings	Display	Light auto off	Disabled 5 seconds 10 seconds 30 seconds 60 seconds 120 seconds	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
9	Settings	Units	Flow	Custom		2)
10	Settings	Units	Totalizer	Custom		2), 3)
11	Settings	Filter	Dynamic filter	Off Low Medium High Very high Maximum	<input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
12	Settings	Filter	Averaging filter	Off Low Medium High Maximum	<input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

13	Settings	Resolution	Flow	0.0001 0.001 0.01 0.1 Auto 1 10 100 1000 10000	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
14	Settings	Resolution	Totalizer	0.0001 0.001 0.01 0.1 Auto 1 10 100 1000 10000	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
15	Settings		Security	Enable password	<input type="checkbox"/>	
16	Settings		Battery auto off	Disabled 15 minutes 30 minutes 60 minutes	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	

- 1) If ordered for air **or** N₂ **or** O₂ and the unit is calibrated with air and all have the same operating conditions, range and dynamics, all these 3 gasses will be programmed. The gas is set default on the customer ordered gas.
- 2) The reference condition of all units under “Real and Norm” are always 0°C and 1013.25 mbara. (Both for the totalizer and flow units). The reference conditions of all “Other Units” are always defined at the time of ordering.
- 3) If no units are specified for the totalizer, it is set it the same as the main unit without the time factor. For example: l_n/min becomes l_n, kg/hr becomes kg, etc. The totalizer unit can be changed by the user anytime. See [4.11.2 Totalizer](#) and [4.12.3 Units](#).

6.20. CE Declaration of Conformity

gas flow technology by **vögtlin**

Konformitätserklärung
Declaration of Conformity



Vögtlin Instruments GmbH
Langenhagstrasse 1
CH-4147 Aesch

Wir erklären in alleiniger Verantwortung, dass die Produkte auf welche sich diese Bescheinigung bezieht, mit den folgenden Normen übereinstimmen:

Gemäss den Bestimmungen der Richtlinie:

2014/30/EU

Richtlinie über die elektromagnetische Verträglichkeit (EMV)

Test Spezifikation:

IEC 61000-4-2
IEC 61000-4-3
IEC 61000-4-4
IEC 61000-4-5
IEC 61000-4-6
CISPR11

Test Vorgabe:

IEC 61326-1

Resultat:

Bestanden

Testcenter:

Mesco
Berner Weg 7 / D-79539 Lörrach

LCIE Bureau Veritas

Nord-Est / Aire de la Thur / F-68840 Pulversheim

Produkte:

GCM-* / GCR-* / GCS-* / GCA-*

red-y compact meter / Massedurchflussmesser
red-y compact regulator / Massedurchmesser mit Ventil
red-y compact switch / Massedurchflussmesser mit Alarm
red-y compact all-in / Massedurchflussmesser mit Ventil & Alarm

**) und etwaige Ausführungen*

Aesch, 14.04.2016

Fabian V. Waltz
Managing Director

We declare under our sole responsibility that the products to which this declaration relates are in conformity with the following standards:

Following the provisions of directive:

2014/30/EU

Electromagnetic compatibility (EMC) legislation

Test specification:

IEC 61000-4-2
IEC 61000-4-3
IEC 61000-4-4
IEC 61000-4-5
IEC 61000-4-6
CISPR11

Test requirement:

IEC 61326-1

Results:

Passed

Testcenter:

Mesco
Berner Weg 7 / D-79539 Lörrach

LCIE Bureau Veritas

Nord-Est / Aire de la Thur / F-68840 Pulversheim

Products:

GCM-* / GCR-* / GCS-* / GCA-*

red-y compact meter / Mass Flow Meter
red-y compact regulator / Mass Flow Meter with Valve
red-y compact switch / Mass Flow Meter with Alarm
red-y compact all-in / Mass Flow Meter with Valve & Alarm

**) and various versions*



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vögtlin
instruments

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6.21. Change history

Date	Version	Replaces	FW	Author	Note
01/06/2015	EN A1-1			PdW	Initiated new Manual
29/06/2015	EN A1-2	EN A1-1		PdW	After review Engineering
03/07/2015	EN A1-3	EN A1-2	3.0.0	PdW	After review Sales
08/07/2015	EN A1-4	EN A1-3	3.0.0	PdW	After review Management
13/07/2015	EN A1-5	EN A1-4	3.0.0	PdW	Clarified current power supply
15/07/2015	EN A1-6	EN A1-5	3.0.1	PdW	Adapted for new firmware
24/07/2015	EN A1-7	EN A1-6	3.0.1	PdW	Adapted 4.11.3 (Units), overview default setting, minor corrections
11/02/2016	EN A1-8	EN A1-7	3.0.3	PdW	Adjusted Manual to improvements in firmware version 3.0.3
26/04/2016	EN A1-9	EN A1-8	3.0.4	PdW	Adjusted Manual to improvements in firmware version 3.0.4
	EN A2-0	EN A1-9		LEU	Relais lifetime, default values. Not released
20/05/2017	EN A2-1	EN A1-9	3.0.5	PdW	Adjusted to Firmware version 3.0.5, change company AG to GmbH

7. Index

	9		Firmware upgrade	40
			Flow splitter disassembly	38
9999999	24		H	
		A	home screens	33
Accuracy	12		Home screens and Menu access	24
alarm contacts	15, 42		Hysteresis	29
alarm module	7, 15, 24, 31		I	
alarm reset	30		Installation	4
Alarms and notifications	24		Installation and commissioning	17
Appendix	41		K	
ATEX	3		K-factors	16
		B	M	
backlight	20, 22, 33, 34, 42		Maintenance / Calibration check	38
Battery	14		measurement principle	8
Battery, how to replace	21		Measurement ranges	13
Block diagram	11		Mounting position and location	18
		C	N	
Calibration	16		Normalized	9
CE Declaration of Conformity	54		O	
Change history	55		Optional Modules	15
Cleaning to remove contamination	38		other gases	16
CMOS technology	10		Other gases	16
Contamination statement	51		Out of range	24, 35
Control behavior	17		overflow	31
<i>Copyright and Liability Disclaimer</i>	3		<i>OVF</i>	24
Customer Service	4		Oxygen	4
		D	P	
Default settings, Overview	52		Pipework	18
Device specifications general	12		Power	4
Dimensional drawings ¼" in inches	46		Pressure compensation	17
Dimensional drawings ¼" in mm	45		Pressure loss	17, 43
Dimensional drawings ½" in inches	48		R	
Dimensional drawings ½" in mm	47		Recycling	3
Documentation supplied	8		Response time	17
		E	Returns	39
ECO mode	20, 34		S	
Electrical data	13		Scope of delivery	17
Electrical power supply	19		Scope of warranty	7
		F	Sealants	18
Features of thermal mass flow meters and controllers	7			
filter fittings	19			
filter settings	35			
Filters / Gas cleanliness	19			

Serial interface	14
Standardized	9
Start-up screen	23
Subject to change	3
Supply voltage	13

T

Temperature compensation	17
Toxic, flammable gases and EX	3
Type code overview	49

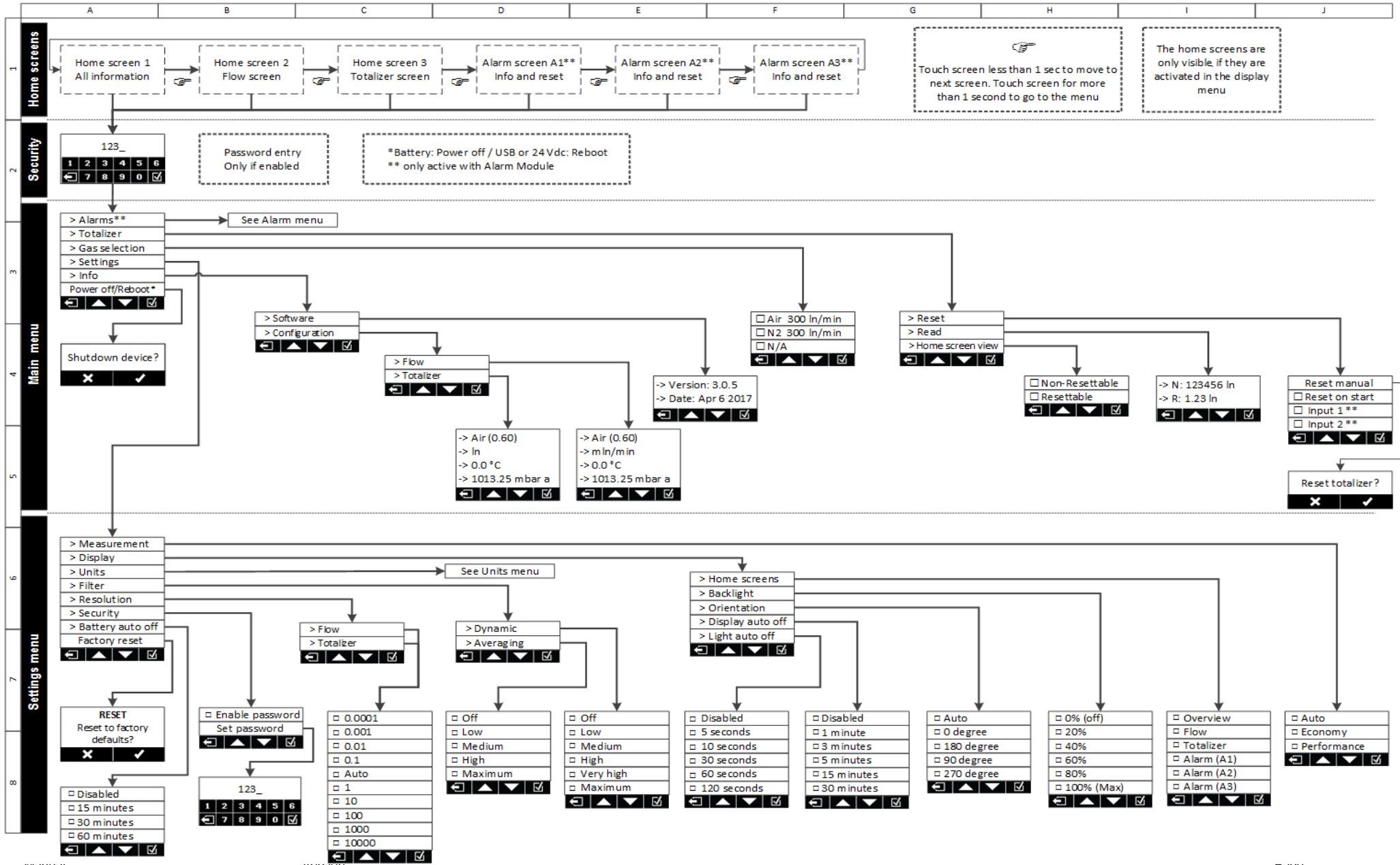
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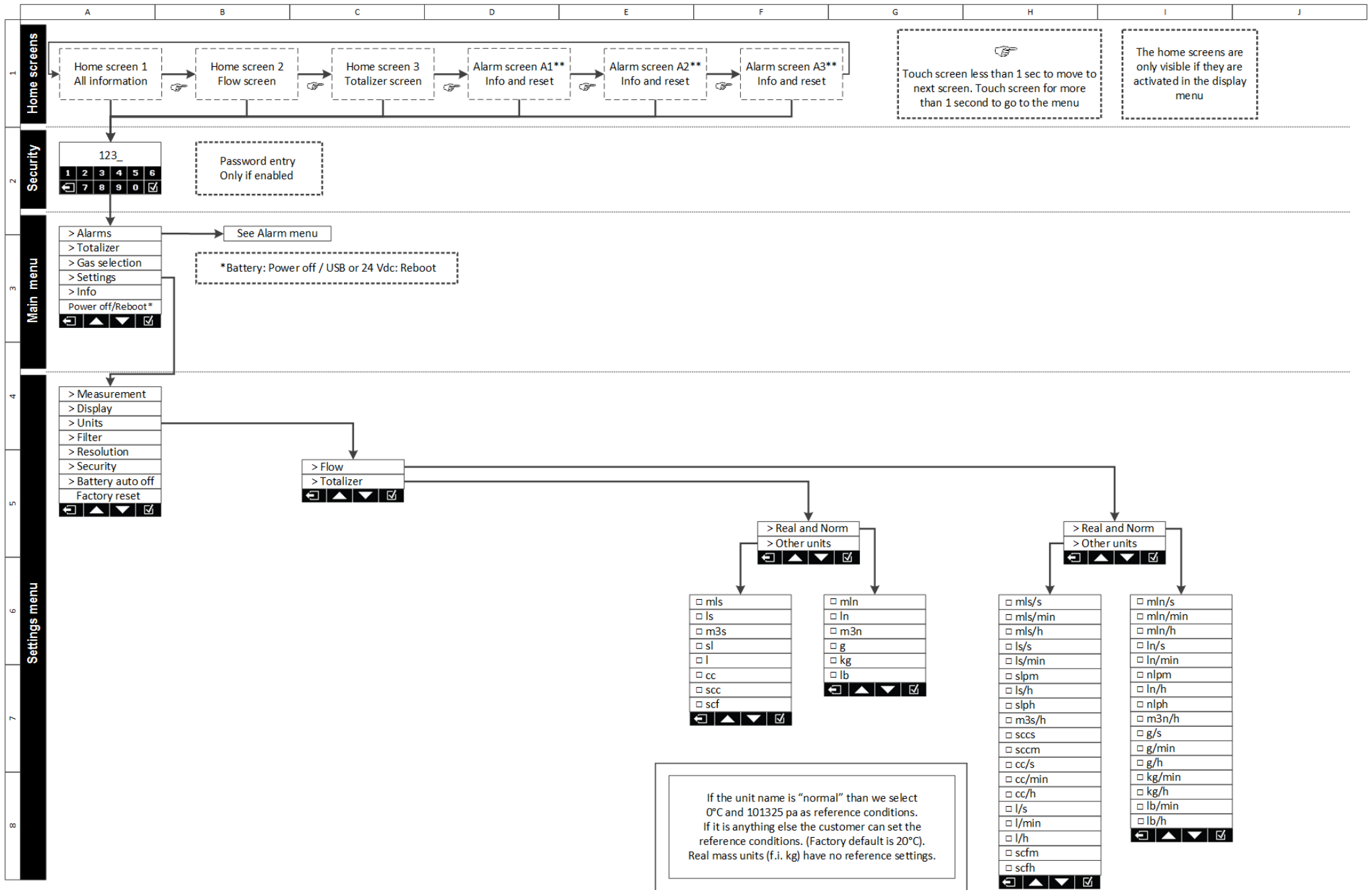
Units	9, 10, 24, 31, 35, 36, 45, 46, 47, 48, 52, 53, 55
USB	7, 8, 12, 13, 14, 17, 19, 20, 22, 33, 34, 37, 40

W

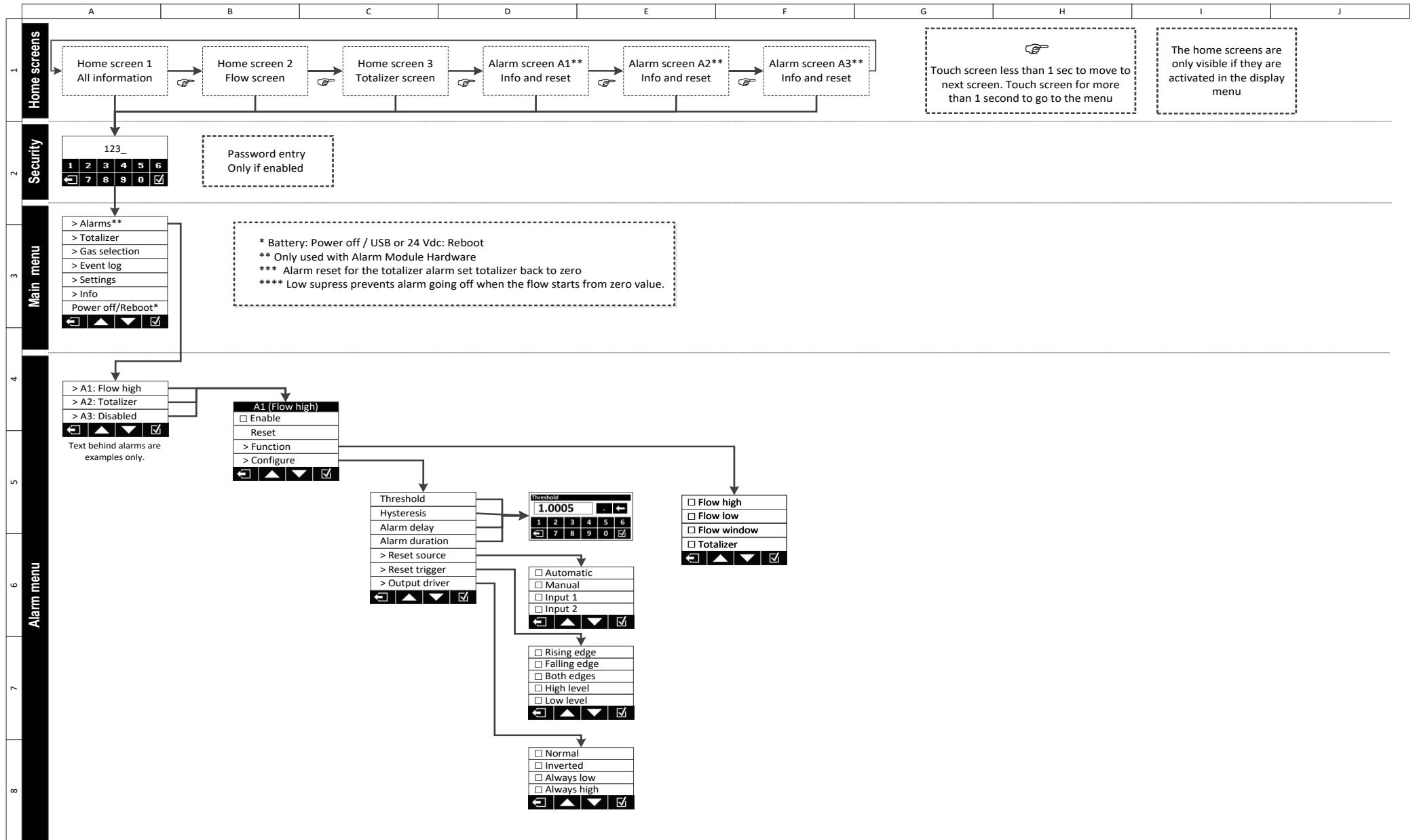
Warm-up time	22
Wetted parts list	50

8. Overview menu red-y compact 2





Alarm menu (Only valid if the Alarm Module has been install)



Space for notes and remarks by user: