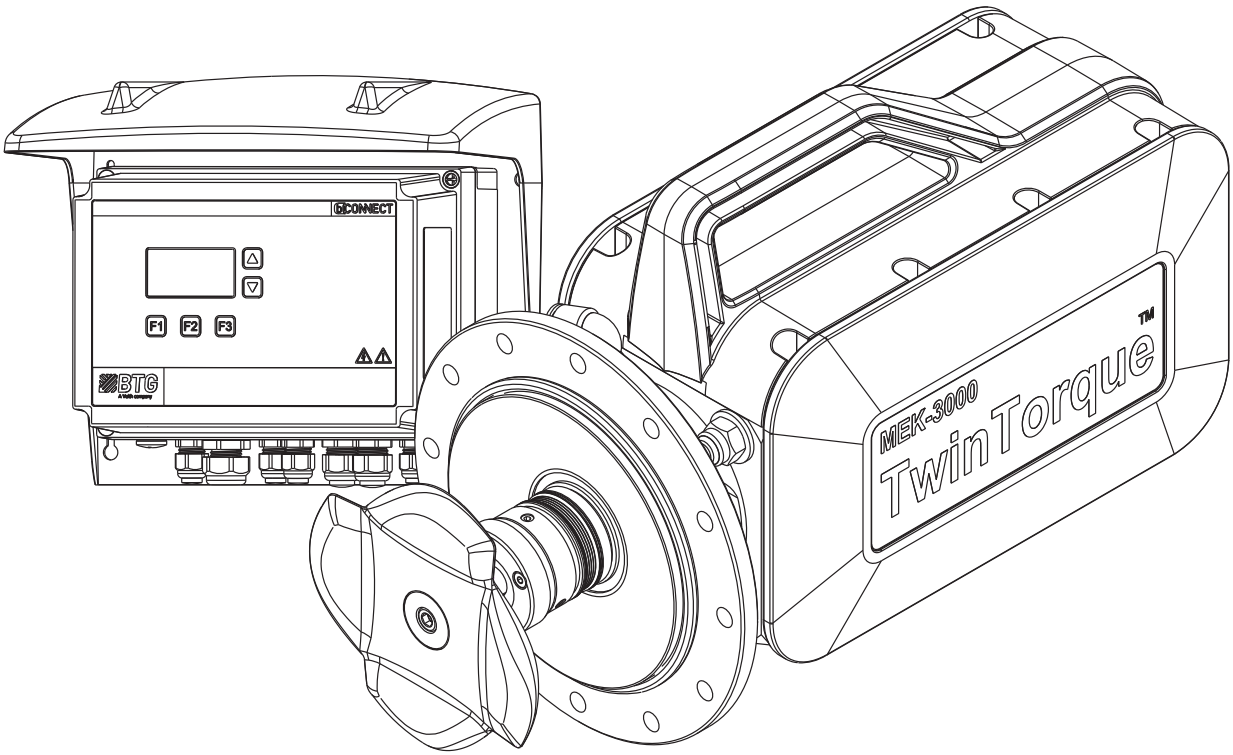
User Manual

MEK-3000

Rotating Consistency Transmitter



BTG
A Voith company

Original Instructions

BTG Instruments AB, 2021

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Important Information

This user manual contains all necessary instructions for installation, operation, maintenance, and basic service of the MEK-3000

NOTE!
Always read the safety instructions before installation and service of the Analyzer!

The instrument is operated using the CPM communication platform.
For guidelines on how to navigate and configure the CPM, see the CPM Operation Guide enclosed as appendix with this manual.

Recycling

Recycle the instrument and all replaced parts according to local, first and foremost national, laws and regulations. Contact BTG to get detailed information on how to disassemble and recycle the instrument safely. BTG should have no liability for any error or damage of any kind due to disassembly or recycle work done.

1 Safety Instructions

General

All BTG products(1) are designed according to Sound Engineering Practice and for the Pulp and Paper Industry.

These Safety Regulations are based on a risk analysis carried out in accordance with the requirements of relevant CE directives in order to comply with European standards for CE marking.

This document provides general safety instructions that apply when operating with BTG products to reduce the risk of accidents. A BTG product is not hazardous in operational mode if these Safety Regulations are adhered to.

These Safety Regulations MUST be read before installing any BTG product. Be careful to follow the safety routines when installing the product, when removing the product for service, and when carrying out service on the product.

Use warning signs for safety information!

Mounting parts, such as measuring vessels and weld-in studs, are dealt with in accordance with the pressure vessel standards of specific countries.

Always take precautions when handling equipment in pressurized pipes.

All installation, operation, service, and other handling must be carried out by trained and authorized personnel and according to valid standards.

Personnel must familiarize themselves with the potential hazards indicated on the product they are working on to understand which instructions apply. If questions arise regarding safety instructions, contact BTG for clarification.

For personal and functional safety: Use only parts that have been manufactured or approved by BTG.

(1) The term "product" is used in this document as a general reference to Instruments, machine parts, or equipment.

Local Regulations

First and foremost National Regulations must be adhered to followed by any Local Regulations. The National and Local Regulations supersede this document. Should neither the National nor Local Regulations cover a particular point within this document, then the Regulations set out in this document should be adhered to.

Target Group

The target group for this document is all personnel who work with products delivered by BTG. These personnel must familiarize themselves with the instructions in this document.

Competence Requirements

It is presumed that all personnel who work on products delivered by BTG have the necessary education, training, experience and competence required to adapt actively the personal safety requirements and the protective measures to their work situation.

English language is typically used for all product information provided by BTG Instruments AB, thus it is required that the target group should have sufficient knowledge in English language in order to understand all product information, including in particular safety related information.

How to read the Safety Instructions

The following conventions are used in a BTG manual:

DANGER!

A DANGER! admonition is used when there is a hazard with a risk for injury or possible death to a person.

WARNING!

A WARNING! admonition is used when there is a risk for damage to program, device, machine, sampler and so on.

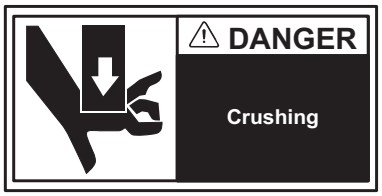
CAUTION!

A CAUTION! admonition is used when there is a risk of system failure, service interruption, disturbances to plant operation, a measuring application and so on.

The admonitions above are hierarchic. A DANGER! admonition includes the possibility of both a WARNING! and a CAUTION! admonition.

Safety Regulations

The symbols below are examples of danger signs found in instructions, manuals, and on products delivered by BTG.



Safety Regulations for Installation and Service

Always turn off all power and other supplies before performing any service or maintenance on the product.

All welding or bolting must take place in accordance with current standards and regulations.

All handling of electrical units must take place in accordance with current standards and regulations.

Use approved lifting gear during installation to prevent injury. Ensure that the equipment is anchored solidly during installation.

If a motor with rotated parts are switched on, there is risk of injury by crushing or cutting if the cover has been removed. Take care when working close to a propeller and a sensor if these are exposed.

Take every professional precaution before servicing. Do not wear gloves or rings which may get caught in the machinery! Use approved protective clothing during installation and service to prevent injury.

Before removing a product from a measuring chamber or opening an inspection cover, check carefully that the line is empty.

Hot or corrosive liquid flowing out under pressure may cause serious chemical burn injuries!

Take care when opening the cover of a electronic box with built-in power supply unit.

This contains live parts which may cause electric shocks.

Live parts are protected against normal contact provided that the connections are made correctly.

When a product is exposed to dangerous basic or acidic corrosive media, it should be removed from the pipeline regularly for inspection. Replace any damaged seals. If pressurized parts on a product or a weld-in stud have corroded, check that the material is correct for the application.

Leakages may cause personal injury or damage to equipment due to corrosion or burning!

Beware of high temperatures during installation and service to prevent injury.

2 Product Introduction

2.1 General

The MEK-3000 TwinTorque takes in-line, rotating, consistency measurement state-of-the-art to a new level. Combining the most robust measuring method with the unique TwinTorque technology results in unrivalled performance in a format providing significantly reduced installation and maintenance costs. The transmitter is supplied by single-phase power via the Communication Platform (CPM).

Aside from the MEK-3000 standard model, two special versions are available: MEK-3015, equipped with a protector for protection against unscreened pulp, and MEK-3050, equipped with a larger flange. In new installations the small flange version yields minimized pipe connections, while the large flange version fits to the conventional studs and measuring vessels.

The versatility of the MEK series is retained with the new MEK-3000. Hence, it can be optimized for every application in the entire process; from the blow line after the digester, in screening and washing stages, and in the bleach plant through to the machine chest. Its total flexibility is accompanied with ultra-high measurement precision with a construction providing extreme compactness, minimized maintenance requirements, and longer life time.

The MEK-3000 is operated using the CPM, which ensures compatibility with present and future communication interface requirements, from analogue output with HART® to field buses.

The MEK-3000 is the fifth generation of rotating transmitters from BTG, and is based on the successful and widely proven MEK rotating transmitters, sold in more than 30,000 units. Bringing BTG's unsurpassed experience and success with rotating consistency measurement together with the TwinTorque technology thus creates new opportunities in consistency measurement and control.

Fig 1 MEK-3000

2.2 Technical Data

General

Type
MEK-3000 in-line rotating consistency transmitter for pulp suspensions

Manufacturer
BTG, Säffle, Sweden

Measuring Principle
Rotating shear force measurement

Quality Assurance
Quality-assured in accordance with ISO 9001. Designed in accordance with relevant CE standards.

Function Specifications

General

Pressure Rating
PN16 (16 bar at 20°C, 230 psi at 68°F) with Ø270 mm flange
PN25 (25 bar at 20°C, 360 psi at 68°F) with Ø180 mm flange

User Interface
Illuminated display and keypad on the CPM

Alarm and Diagnostics
Motor and electronics supervision, high/low temperature and load levels, etc.

Calibration sets
Four separate calibration sets, individually programmable, and externally controllable using a binary-coded switch

Communication Platform
For information about the communication platform, including input and output signals, see section 2.5: *Communication Platform CPM*

Process Specifications

Consistency Limits
1 - 16% fiber consistency, depending on type of pulp and sensing element.

Flow Limits
0.5 - 5 m/s [1.6 - 16.4 fps] depending on application

Process Temperature Limits
Min. 15 °C [60 °F]
Max. 120 °C [248 °F]

Ambient Temperature Limits
Max. 50 °C [122 °F] without water cooler
Max. 60 °C [140 °F] with water cooler

Damping
Set between 0 and 99 s.

Support System Specifications

Flushing Water
Standard quality water, with no impurities larger than 200 μm [8 thou].
Recommended flow: 0.5-1.5 l/min [0.13-0.4 gal/min.]
Min. 0.5 bar [7 psi]

Power Consumption
Max. 320 VA

Supply Voltage
100-240 ±10% V AC, 50/60 Hz, Single phase to CPM
Supplied with 24 V DC from the CPM

Cooling
Optional water cooler available for operation in hot environment
(ambient temperature up to 60 °C [140 °F])
Max. cooling water temperature: 20 °C [68 °F]

Performance Specifications

Repeatability
σ = 0.002% Cs

Physical Specifications

Mounting
Mounted to the pipe through a measuring vessel or a weld-in stud depending on pipe size and transmitter flange type

Transmitter Flange

Ø180 mm:	Min 200 mm [8"] pipe using weld-in stud 80-150 mm [3-6”] pipe using measuring vessel or saddle
Ø270 mm:	100-250 mm [4-10"] pipe using measuring vessel Min 300 mm [12"] pipe using weld-in stud

The transmitter can be mounted in a horizontal, vertical or inclined pipe.

Materials

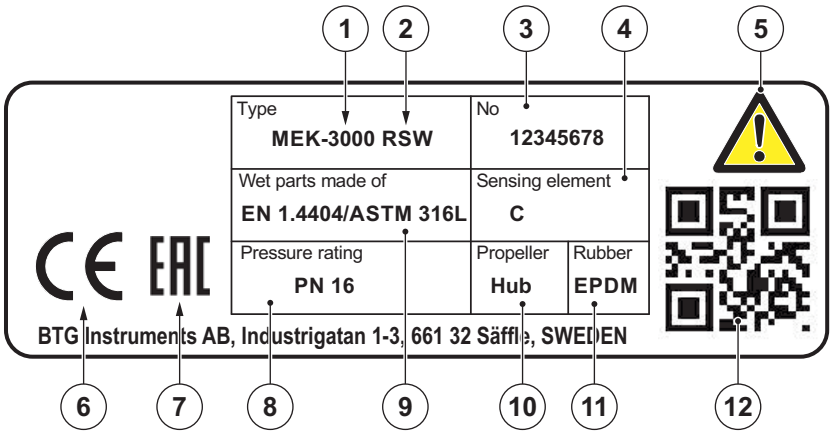
Housing:	Aluminum, painted with epoxy/polyurethane.
Cover:	ABS/PC with EMC-shield inside
Wetted parts:	Stainless steel equiv. to EN 1.4404/ASTM 316L or Avesta 254 SMO depending on application

Degree of Protection
Equivalent to IP65, NEMA 4x

Weight
15kg [33 lb.] with Ø180 mm flange
19 kg [42 lb.] with Ø270 mm flange

2.3 Type Plate Explanation

Fig 2 Type sign



1. **Transmitter model**
2. **Mechanical sealing code**

   BSW, RSW

   First letter; Mechanical sealing type:

   - B = Metal bellows type
   - R = Roplan type

   Second Letter; Material

   - S = Silicon carbide

   Third letter; Water flushing option:

   - W = Model with water flushing
3. **Manufacturing number**

   BTG internal product identification number.
4. **Sensing element type**

   Available types: A, B, C, G, H, I, J
5. **Warning sign**

   The device is designed for industrial use. Installation, handling and service must only be carried out by trained and authorized personnel and according to relevant standards. Read the manual for detailed information and pay special attention to the warning signs!
6. **CE-marking**

   The MEK-3000 is approved according to CE directives.
7. **EAC-marking**

   The MEK-3000 conform to all technical regulations of the Eurasian Customs Union.
8. **Pressure rating**

   PN 16 or PN 25
9. **Wetted parts made of**

   EN 1.4404/ASTM 316L or 254 SMO

10. **Propeller type**

    Large, Small, or Hub (no propeller)

11. **Rubber quality in wetted parts**

    FPM (Standard) = Fluorocarbon rubber for pH 1-12.

    EPDM = Ethylene Propylene rubber for pH 8-14.

12. **QR code**

    QR code to scan for more information about the MEK-3000 on the site: www.btg.com/mybtg/en/instruments/mek-3000.

2.4 CE Declaration

When using the units in combinations other than those tested for, BTG can not guarantee CE directive conformity.

The units in combination with customer-installed external devices may conform with EMC and safety requirements when properly installed and CE-marked equipment is used.

The system operator is responsible for CE directive conformity. Conformity must be verified by inspection.

Declaration of Conformity

CE mark

CONSISTENCY TRANSMITTER

TYPE: MEK-3000

BTG INSTRUMENTS AB
P.O. Box 602
661 29 Säffle
Sweden

This declaration of conformity is issued under the sole responsibility of the manufacturer.

We declare that the above Consistency Transmitter conforms to:

2014/35/EU	Low Voltage Directive, LVD
2014/30/EU	Electromagnetic Directive, EMC
2014/68/EU	Pressure Equipment Directive, PED

The following harmonized standards have been practiced:

IEC/EN 61010-1:2010	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
EN 61326-1:2013	Electrical equipment for measurement, control and laboratory use - EMC requirements Part 1: General requirements
EN 13480-5:2013	Metallic industrial piping - Part 5: Inspection and testing
EN 13480-3:2017	Metallic industrial piping – Part 3: Design and calculation

Authorized Signature:..... Date: 2021-03-30.....

Name: Björn Fahlin..... Position: Director of Operations

2.5 Communication Platform CPM

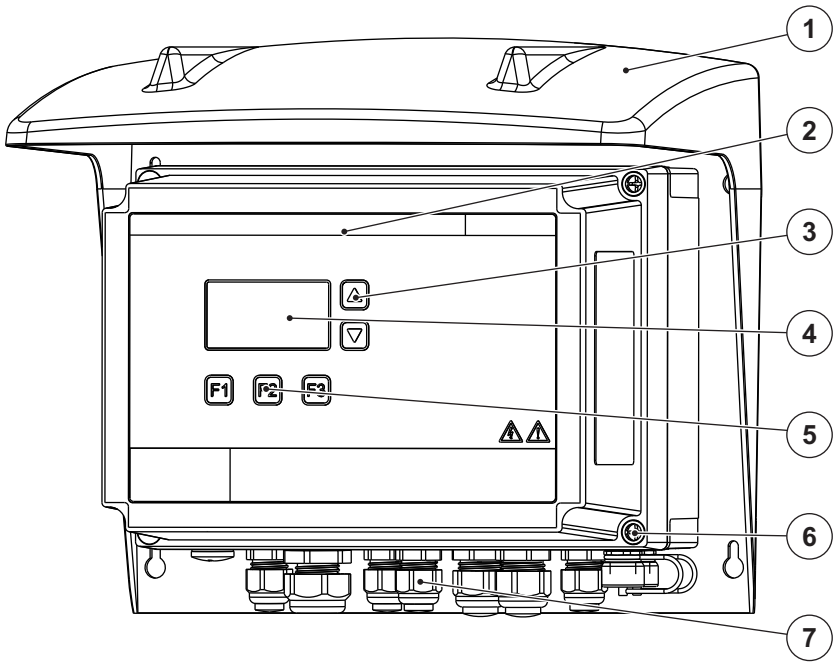
The CPM is delivered as a complete unit from BTG, normally in conjunction with an instrument.

The CPM has the following functions:

- Local display and console for full configuration and operation of the instrument
- Large illuminated display for easy reading
- Protected from splash and sun

Fig 3 CPM overview

1. Protective cover
2. Front cover
3. Scroll keys
4. LCD display with backlight
5. Function keys
6. Closing screw
7. Cable glands



2.5.1 Technical Data

General

Type
CPM Communication Platform.

Manufacturer
BTG, Säffle, Sweden.

Quality Assurance
Quality-assured in accordance with ISO 9001.

Product Safety
Fulfills all relevant CE-directive requirements, RCM listed, and ETL listed.

Radio Approvals
US, Canada, EU, Japan, Australia, and New Zealand.

Emission / Immunity / Safety
FCC Part 15 Class B
EN 61010-1:2010
EN 61326-1:2013
EN 301489-1 V2.1.1
EN 301489-17 V3.1.1
EN 300328 V2.1.1
EN 300893 V1.8.1
UL 61010-1:2012 Ed.3 +R:29Apr2016
CSA C22.2#61010-1-12:2012 Ed.3+U1;U2

Function Specifications

HCM-8000

Hart communication module using HART® protocol.
Equipped with slot for SD memory card.

Analog output (AO1)
4 - 20 mA. Galvanic isolated. Current limited to min. 3.9 and max. 20.5 mA.
Loop load signal: Voltage supply/load 24 V DC
Active or passive output
Superimposed signal over 4 - 20 mA current loop according to standard HART® protocol.

Analog input (AI1)
4 - 20 mA 250 Ω input resistance

Digital input (DI1 - DI3)
Galvanic isolated
High-ohmic = logical 0
+24 V ≥ 12 mA = logical 1

Digital output (DO)
Galvanic isolated
Maximum 120 mA
Maximum 30 V DC

FCM-80x0

Fieldbus communication module programmed for PROFIBUS.
Equipped with slot for SD memory card.

Output / Input signal
PROFIBUS (PA)

CCM-8200

Network Interfaces:

Wired Network Connectivity
Ethernet, 10/100 Mbit - RJ45.
Ethernet interface supporting up to 100baseTx.
IEC 11801:2002 CatV compliant M12 type D socket.
The interface supports Auto MDI-X (crossover).

Wireless Network Connectivity
Wi-Fi, Dual-band 802.11 a/b/g/n/ac 1x1

CPM User Interface

Illuminated display. Key pad for adjustment of instrument settings.

Support System Specifications

Supply Voltage
Power supply unit 100 - 240 V AC, 50-60 Hz.
AC input range: 90 - 264 V continuous operation.

Disconnecting Device
An external 2-pole switch close to the CPM is required. The switch must be approved in accordance with the IEC 60947-2 and IEC 60947-3 requirements.

Power Consumption
100 - 300 VA

Altitude
0 to 2000 m (0-6560ft) without any restrictions.
2000 to 6000 m (6560 to 20000ft) reduce output power or ambient temperature.
Altitude de-rating = 5 W / 1000 m or 5 °C / 1000 m.

Humidity
5 to 95% r.h (IEC 60068-2-30)

Over-voltage Category
Category III: IEC 62103, EN 50178, altitudes up to 2000 m
Category II: altitudes from 2000 m to 6000 m

Degree of Pollution
2: IEC 62103, EN 50178, not conductive

Physical Specifications

Materials

Casing:	Polycarbonate thermo plastic
Cable fittings:	Polyamide thermo plastic

Storage Temperature
Max. 80 °C (176 °F)
Min. -25 °C (-13 °F)

Operation Temperature
Max. 50 °C (122 °F)
Min. 0 °C (32 °F)

Degree of Protection
IP 65, comparable to NEMA 4x and better, the CPM is intended for use indoors.

Weight
CPM: 2 - 2.5 kg (4.4 - 5.5 lbs) depending on configuration

Cables
Power supply flexible cable: 0.3 - 2.5 mm^2 (AWG = 28-12)
Signalling cable: 0.2 - 2.5 mm^2 (AWG = 24-12)

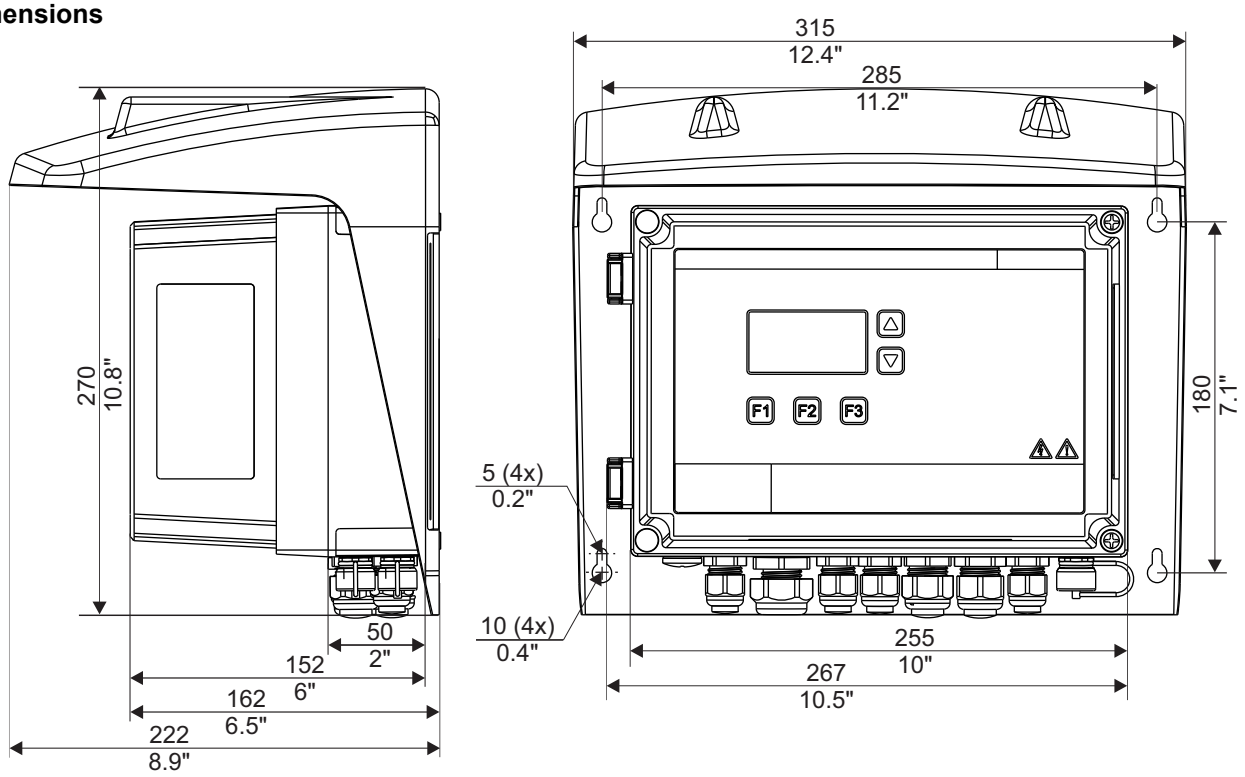
Transmitter Cable

Standard length:	10 m [33 ft]

Cable Inlets
There are cable glands for signal cables (diameter 4-8 mm) and for power supply cable (diameter 4-12 mm) in the bottom of the CPM.

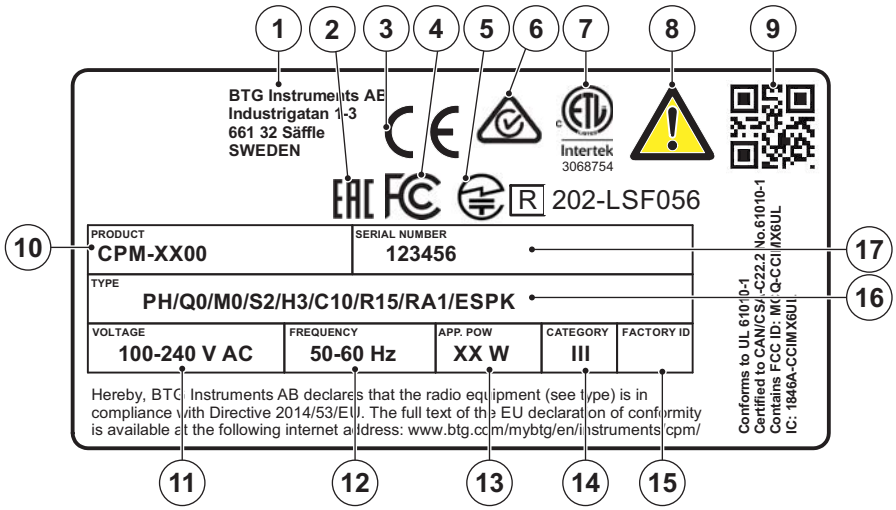
2.5.2 Dimensions

Fig 4 Dimensions



2.5.3 Type Plate Explanations

Fig 5 Type plate



1. **Manufacturer**
2. **EAC-marking**

   The CPM conform to all technical regulations of the Eurasian Customs Union.
3. **CE-marking**

   The CPM is approved in accordance with CE directives.
4. **FCC Declaration of Conformity**

   Certifies that the electromagnetic interference from the device is under limits approved by the Federal Communications Commission.
5. **Radio label marking**

   R: 202-LSF056
6. **C-TIC marking**

   The CPM is RCM listed.
7. **ETL-marking**

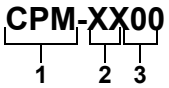
   The CPM is approved by ETL.
8. **Warning sign**

   The CPM is designed for industrial use. Installation, handling and service must only be carried out by trained and authorized personnel and in accordance with relevant standards. Read the manual for detailed information and pay particular attention to the warning signs!
9. **QR code**

   QR code to scan for more information about the CPM on the site: www.btg.com/mybtg/en/instruments/cpm.

10. Product

The instrument model is specified according to the code system explained below:



1	Product Group
CPM	Communication platform
2	**Power type**
13	50 W Power supply
14	240 W Power supply
15	80 W Power supply
3	**Input/Output Unit**
00	**If field 4 = PH:** HCM-8000
	If field 4 = PP: FCM-8000
10	**If field 4 = PH:** HCM-8010
	If field 4 = PP: FCM-8010

11. Voltage

100-240 V AC to power supply.

12. Frequency

The CPM operates at both 50 and 60 Hz.

13. Apparent power

Maximum power consumption (W).

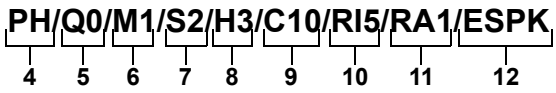
14. Installation category

In accordance with CE-Directive. Fixed installation. Resistant to transients.

15. Factory identification

16. Type specification

The instrument variant is specified according to the code system explained below:



4	Communication Protocol
PH	Analog 4-20 mA with HART® (HCM-80x0)
PP	Profibus PA (FCM-80x0)
PF	Foundation Fieldbus supplied with FCI-1000
5	**Sensor Control Module**
Q0	No module
Q1	Sensor control module SCM-8000
6	**Communication Module**
M0	No module
M1	Communication module CCM-8200
7	**Serial Connector**
S0	No serial connector
S1	One serial connector
S2	Two serial connectors
8	**Housing**
H1	Standard housing with protecting cover
H2	Standard housing without protecting cover
H3	Large housing with protecting cover
H4	Large housing without protecting cover
9	**Sensor cable**
	Blank = no sensor cable
Cxx	xx = 0.5, 5, 10, 20, 30, 40, or 50 meters (10 m [32.8 ft])
CxxHF	HF = Halogen free
10	**Interlock relay**
	Blank = no relay
RI1	Interlock interface relay 12 V DC
RI2	Interlock interface relay 24 V AC/DC
RI3	Interlock interface relay 48 V DC
RI4	Interlock interface relay 60 V DC
RI5	Interlock interface relay 120 V AC/ 110 V DC
RI6	Interlock interface relay 230 V AC/ 220 V DC
11	**Alarm relay**
	Blank = no alarm relay
RA1	Alarm relay max 230 V AC/ 220 V DC
12	**Extended information**
	Blank = no information
ESEC	Configured as secondary CPM
ESPK	Only for SPK-5500
ESPM	Only for SPM-5500

17. Serial number

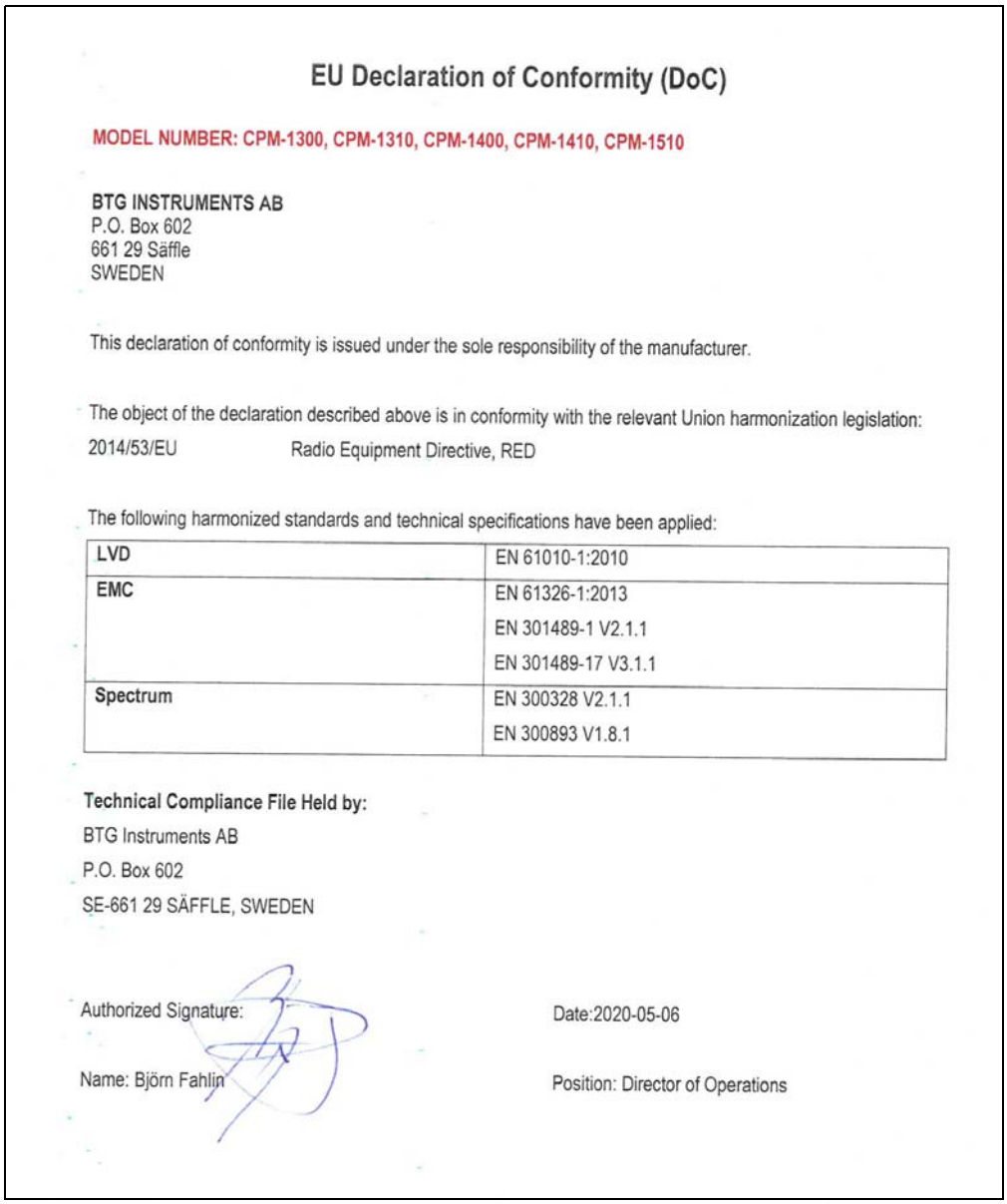
BTG internal product identification number.

2.5.4 CE-Declaration

When using the units in combinations other than those tested for, BTG can not guarantee CE-directive conformity.

The units in combination with customer-installed external devices may conform with EMC and safety requirements when properly installed and CE-marked equipment is used.

The system operator is responsible for CE-directive conformity. Conformity must be verified by inspection.



EU Declaration of Conformity (DoC)

MODEL NUMBER: CPM-1300, CPM-1310, CPM-1400, CPM-1410, CPM-1510

BTG INSTRUMENTS AB
P.O. Box 602
661 29 Säffle
SWEDEN

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:
2014/53/EU Radio Equipment Directive, RED

The following harmonized standards and technical specifications have been applied:

LVD	EN 61010-1:2010
EMC	EN 61326-1:2013 EN 301489-1 V2.1.1 EN 301489-17 V3.1.1
Spectrum	EN 300328 V2.1.1 EN 300893 V1.8.1

Technical Compliance File Held by:
BTG Instruments AB
P.O. Box 602
SE-661 29 SÄFFLE, SWEDEN

Authorized Signature:

Date:2020-05-06

Name: Björn Fahlin

Position: Director of Operations

2.5.5 Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Unique Identifier: CPM-1300, CPM-1310, CPM-1400, CPM-1410, CPM-1510

Responsible Party - U.S. Contact Information

BTG Americas Inc.

Instruments (USA)

5085 Avalon Ridge parkway

Suite 100

Norcross GA 30071

www.btg.com

FCC Compliance Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

3 Installation Planning

3.1 Process Site Selection for Transmitters

Careful siting of the transmitter is essential for optimum performance and ease of maintenance.

The transmitter can be installed in a vertical, horizontal or sloping pipe. If installed in a horizontal or sloping pipe, the location should be carefully selected so that air is not trapped into the pipe where the transmitter is installed.

Your BTG sales engineer can help you select the suitable equipment and find out the location that will give the best results in line with your specific control strategy.

Important recommendations:

There are a number of considerations to take into account:

1. To ensure minimum time lag, install the transmitter as close as possible to the point where the dilution water is injected, considering minimum calming length.
2. Make sure the straight sections before and after the transmitter are sufficiently long.
3. The transmitter must be installed **on the side** of sloping or horizontal pipes. Avoid installing it on top of the pipe, as air bubbles, if any, may disturb the measuring.
4. It is important to choose a location with sufficient space when inserting and removing the transmitter and when opening the cover. Remember to leave sufficient room for insertion and removal.
5. Install the transmitter so that it is protected from direct mechanical damage. Install under a roof if there is any risk of frequent water or pulp spray.
6. Protect the transmitter from heavy vibration.

3.2 Dilution Water Supply

Dilution water must be pressure controlled or otherwise protected from major pressure variations.

To ensure good control, dilute no more than 20% in each dilution stage, though a higher percentage may be acceptable early in the process.

If considerable dilution is required it should be carried out in two stages, 70% to 80% of the water being added in the bottom part of the pulp chest and the remainder in the form of a fine dilution upstream of the pump.

To avoid consistency variations, thoroughly mix the bottom of the pulp chest upstream of the transmitter.

The dilution water pipe must be inserted in such a way that it extends 15 - 50 mm [0.6 - 2 inch] (~10% of pipe diameter), depending on the pipe size, into the main pipe on the suction side of the pump, see fig 6 on page 23. The pipe must be inserted perpendicular to the suction stud. The pipe should be located at 1/3 of the distance between the pump and the chest, measured from the pump, to avoid back flow into the chest.

At the point of injection the dilution water pipe should be dimensioned to produce a rate of flow three to four times larger than the flow in the main pipe. Typically this means a dilution water flow 3 – 5 m/s [10–16.5 ft/s] at max flow in the suction pipe. The dilution water pipe should have the same or larger dimension as the valve bore to prevent the valve from being plugged by pulp at water pressure loss.

Choose a dilution water valve with linear characteristics. The pressure drop over the valve should be at least 0.5 bar [7 psi] and should exceed 25% of the total pressure drop in the dilution water line. The valve and its actuator must operate with the least possible backlash and smallest possible dead zone. The valve must be tight when in its closed position.

NOTE!
The shut off valve (valve A in figure 6) must never be used to control the flow. It must be kept fully open at all time of operation.

Fig 6 Dilution Water Supply

$\Delta\rho$ = pressure drop, min. 0.5 bar [7 psi]

V_1 = Inlet water flow velocity, 3 - 5 m/s [10 - 16.5 ft/s]

V_2 = Recommended flow velocity

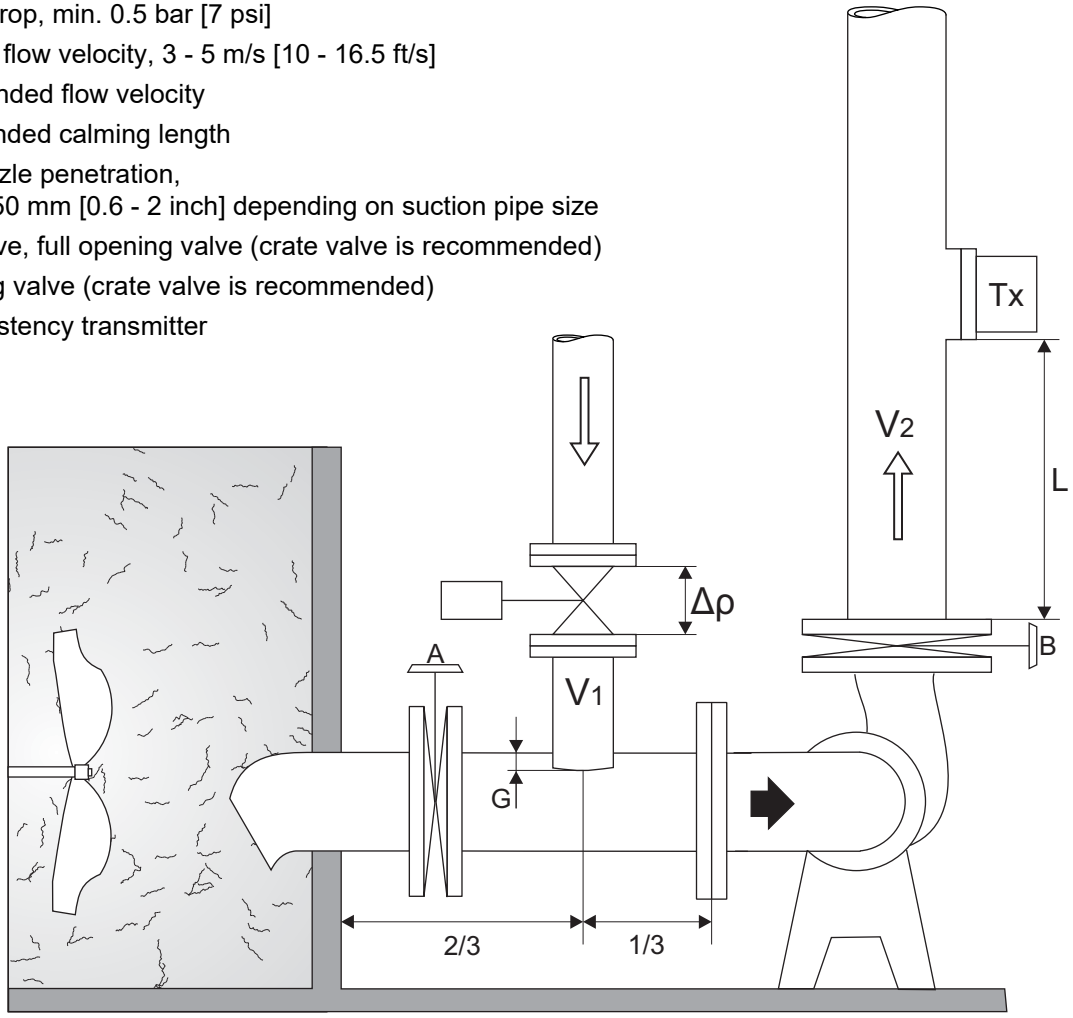
L = Recommended calming length

G = Water nozzle penetration,
min. 15 - 50 mm [0.6 - 2 inch] depending on suction pipe size

A = Shut off valve, full opening valve (crate valve is recommended)

B = Full opening valve (crate valve is recommended)

Tx = BTG consistency transmitter



3.3 Process Site Selection

The minimum distance the transmitter should be located upstream or downstream of a pump, bend or elbow is the greater of two numbers (see figure 7).

Upstream the transmitter, L_U (consistency < 8%):

- 1 m [3 ft]

  or

- The diameter of the pipe multiplied by 3

Upstream the transmitter, L_U (consistency > 8%):

- 0.5 m [1.5 ft]

  or

- The diameter of the pipe multiplied by 1.5.

Downstream the transmitter, L_D:

- 0.5 m [1.5 ft]

  or

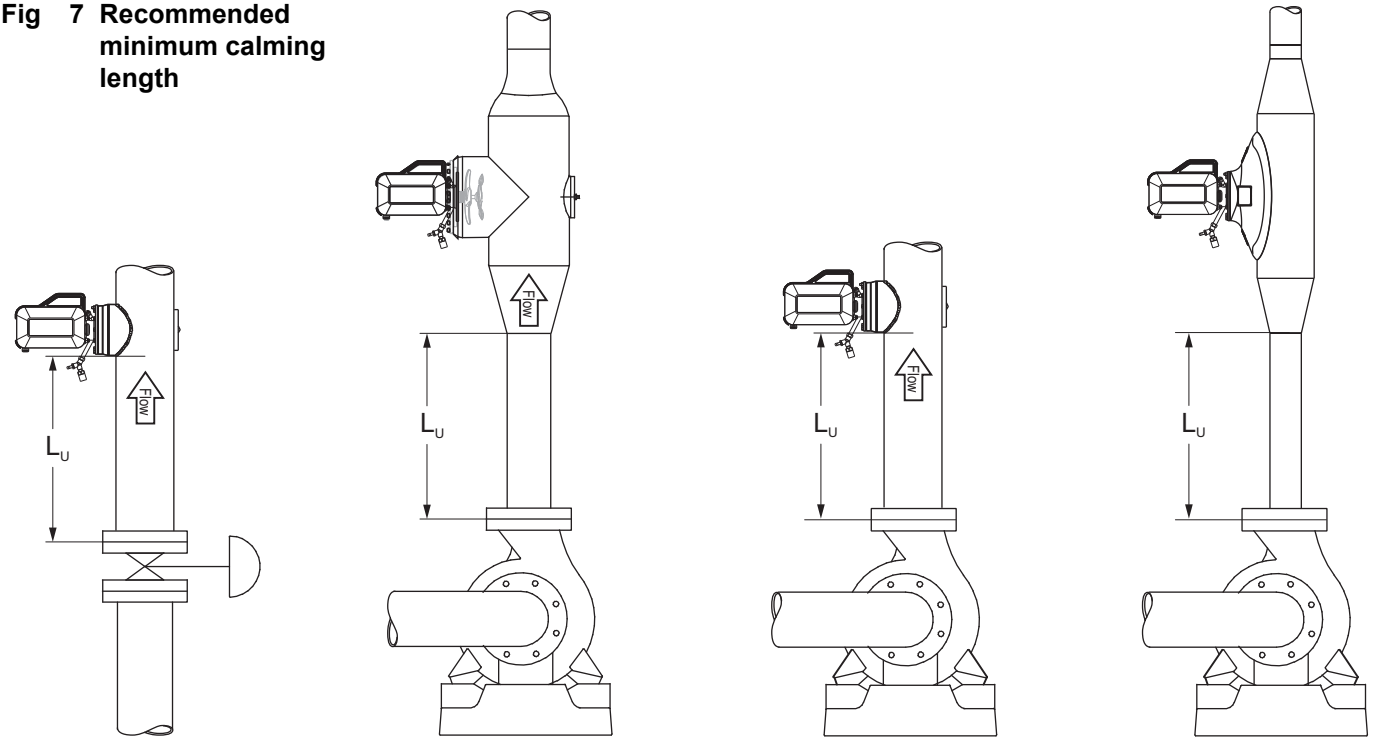
- The diameter of the pipe multiplied by 1.5.

NOTE!
Always choose the largest of the values calculated above.

NOTE!
In order to obtain the best measuring results, it is strongly recommended that the transmitter is mounted in relation to the piping and other equipment as shown in the figures above.

NOTE!
It is recommended to have the pump and the MEK interlocked in combination, so when the pump stops also the MEK will stop.

Fig 7 Recommended minimum calming length



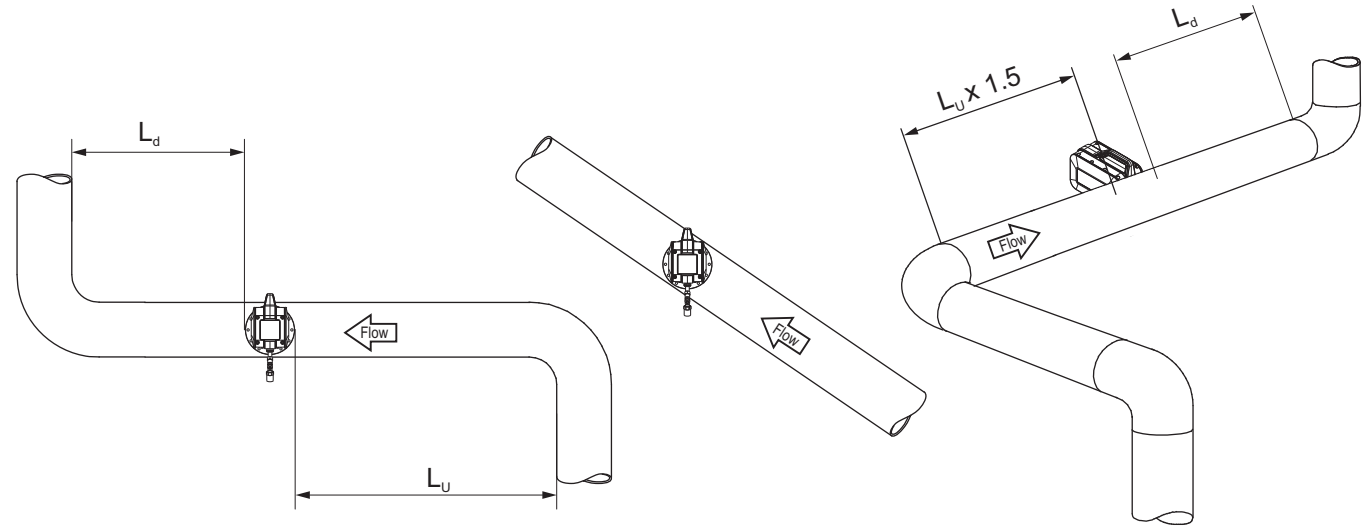
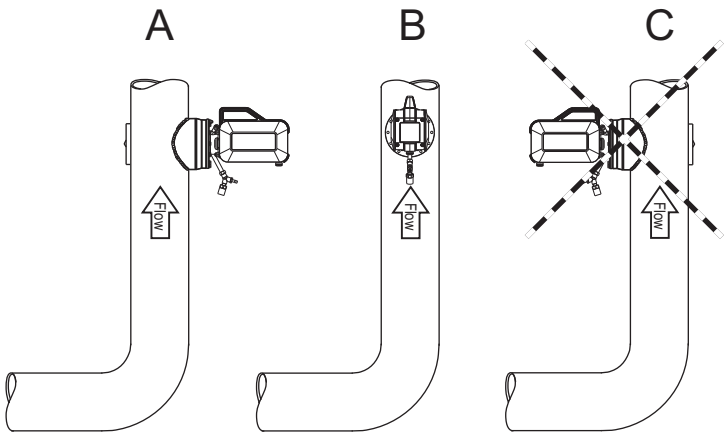


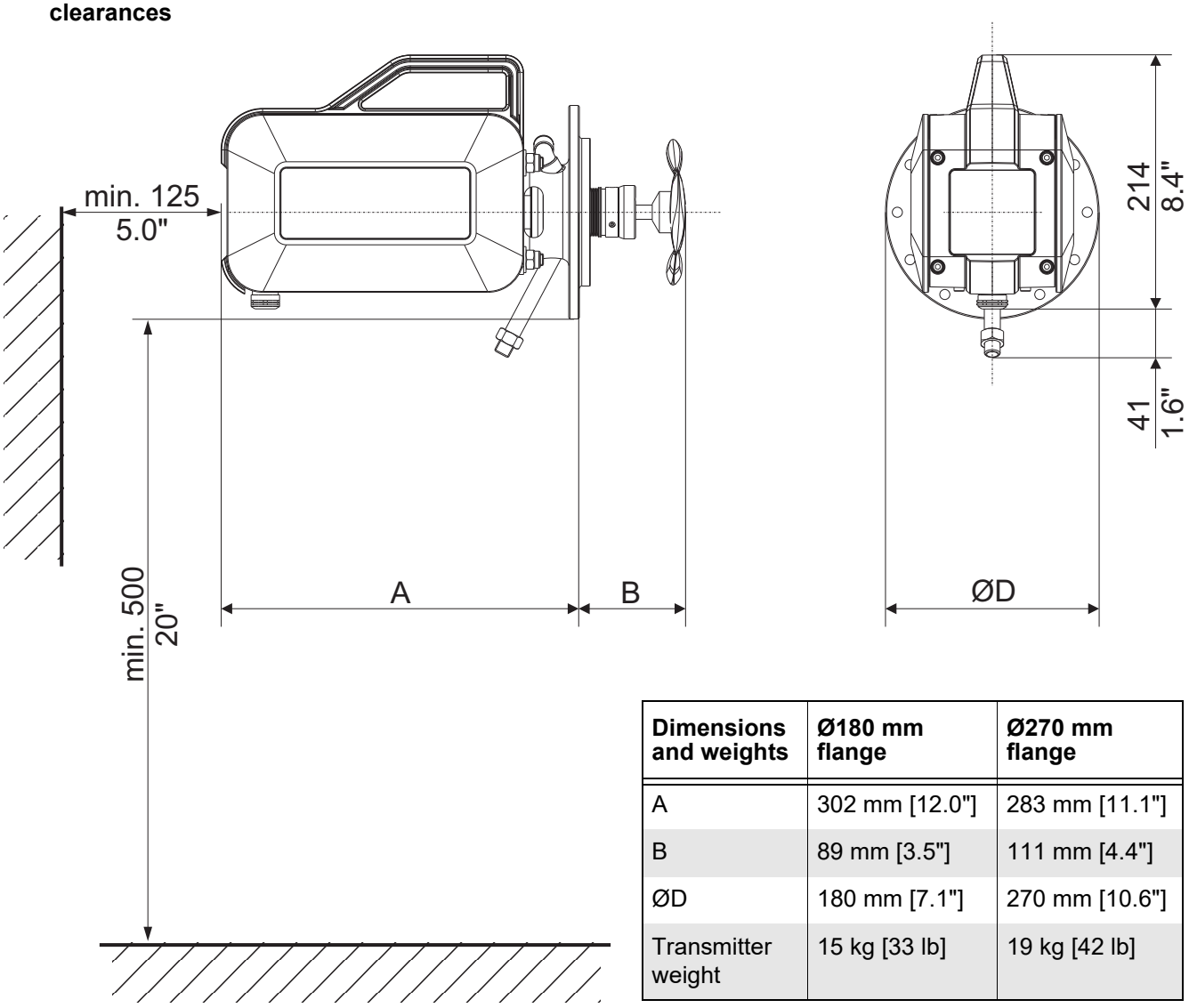
Fig 8 Installation of the transmitter close to a pipe elbow



NOTE!
Alternative A is the most suitable.
Avoid alternative C.

3.3.1 MEK-3000 Dimensions and Mounting

Fig 9 Dimensions and recommended clearances



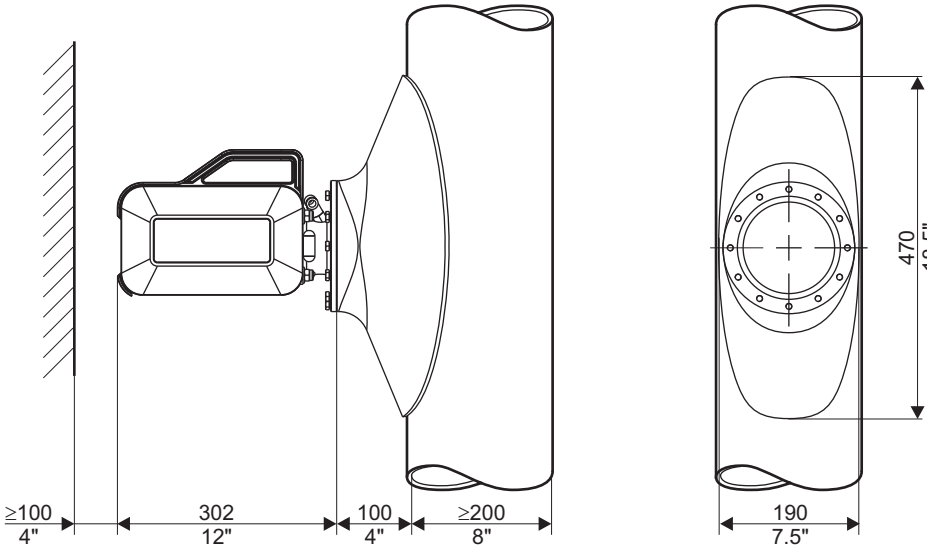
Dimensions and weights	Ø180 mm flange	Ø270 mm flange
A	302 mm [12.0"]	283 mm [11.1"]
B	89 mm [3.5"]	111 mm [4.4"]
ØD	180 mm [7.1"]	270 mm [10.6"]
Transmitter weight	15 kg [33 lb]	19 kg [42 lb]

3.3.2 Weld-in Saddle

NOTE!
For installation where the pipe diameter is less than 200 mm, the pipe must be coned to a diameter of at least 200 mm before the weld-in saddle can be installed.

Saddle can only be used on Ø180 mm flange and in consistency range of 2 - 12% Cs. Distances in 3.1 are the same for saddle as for stud/vessel.

Fig 10 Weld-in saddle



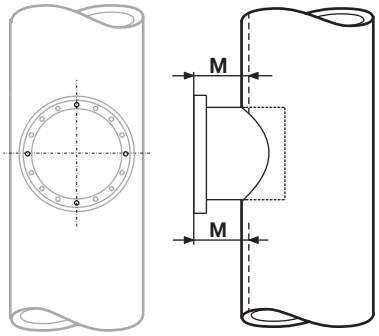
3.3.3 Measuring Chamber with Weld-in Stud

NOTE!
For installation of small flanges where the pipe diameter is less than 200 mm, the pipe must be coned to a diameter of at least 200 mm before the weld-in stud can be installed. For large flanges the pipe diameter must be at least 300 mm otherwise a measuring vessel should be used.

The M-measurement is measured from the inside of the pipe (see figure below). It is determined in advance and may be either 45 or 150 mm (consistency, < 4% = 150, > 4% = 45).

In installations where M = 45 or 150 mm and the pulp is unscreened, deflectors must be installed in the pipe.

Fig 11 M-measurement (Measuring Chamber)



M-measurement		
Consistency	**Ø180 mm flange**	**Ø270 mm flange**
< 4%	N/A	150 mm [6"]
> 4%	45 mm [1.8"]	70 mm [1.8"]

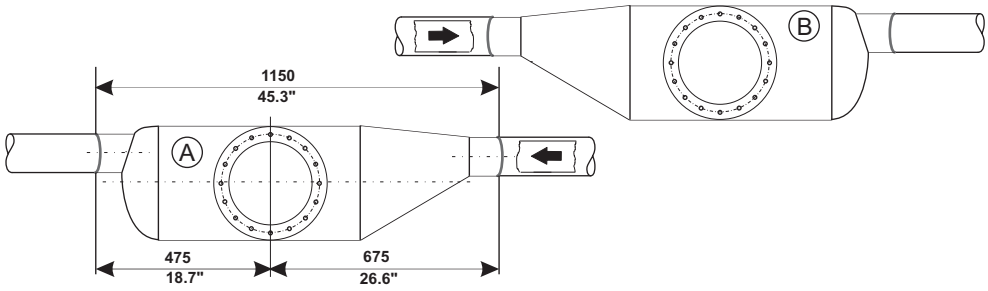
3.3.4 Measuring Vessel

Measuring vessels for use in low pressure installations may be of left-hand or right-hand design depending on the flow direction (see fig 12).

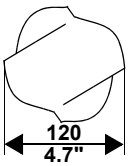
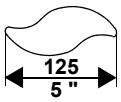
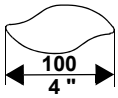
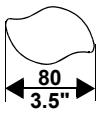
Fig 12 Measuring Vessels

A = Left hand design

B = Right hand design



3.3.5 Sensing Elements

Sensing element type	Characteristic	Fiber type	Consistency range		Default range values		Feedback in water
			Lower limit	Upper limit	Lower limit	Upper limit	
A (MEK-3050 only)		Long Short Sludge	0.8% 0.8% 1.5-2%	2.5% 2.5% 10-15%	1.00%	2.50%	22%
B (MEK-3050 only)		Long Short --	1.0% 1.0%	5.0% 6.5%	2.00%	4.00%	15.5%
C		Long Short --	2% 2.0%	7% 8%	3.00%	6.00%	9%
H		Long Short	5% 6%	10% 11%	8.00%	10.00%	11%
I		Long Short	7% 8%	12% 13%	10.00%	13.00%	7%
J		Long Short	10% 11%	16% 18%	12.00%	15.00%	6%

3.3.6 Propeller and Hub recommendations

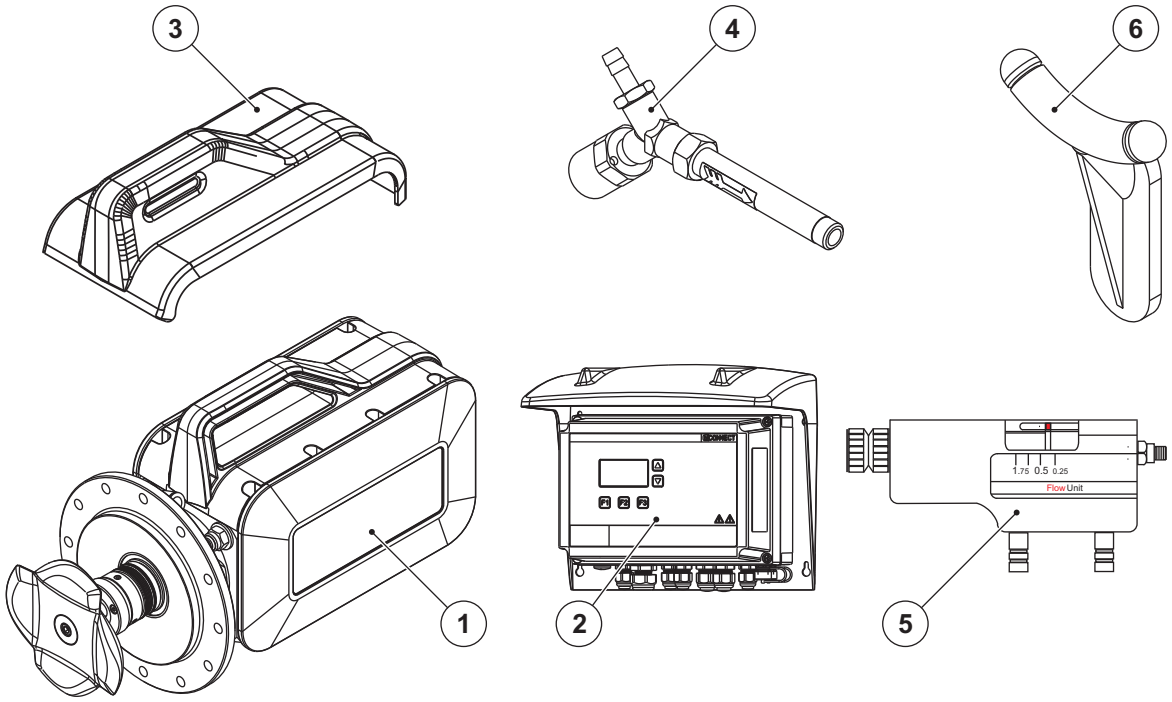
For MEK-3000 and MEK-3015 Hub should be used.

MEK-3050 can use propeller when measuring stud "M-distance" is 150 mm with the below recommendation else Hub should be used.

Propeller type	Consistency range
Large	1.5 - 5 %Cs
Small	< 1.5 %Cs

4 Installation Instructions

4.1 Unpacking

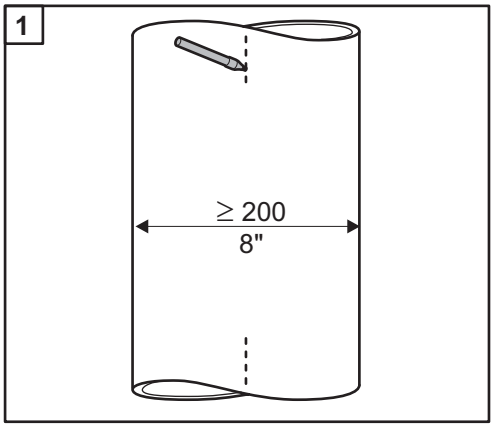


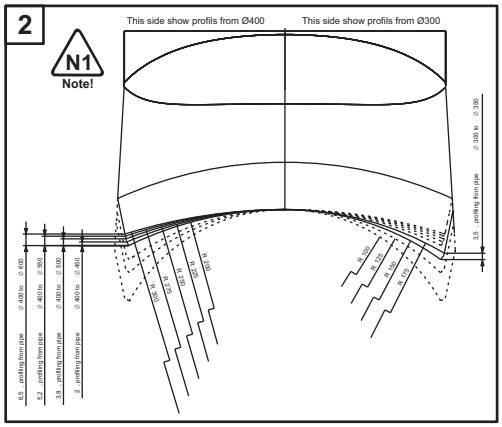
1. 1 x Rotating Consistency Transmitter, MEK-3000
2. 1 x Communication Platform, CPM-1400
3. 1 x Dirt Cap
4. 1 x Flushing water connection
5. 1 x Seal water control unit (optional)
6. 1 x Protector (MEK-3015 only)
7. 1 x Mounting kit (not shown)
8. 1 x Product Document Instruction (not shown)

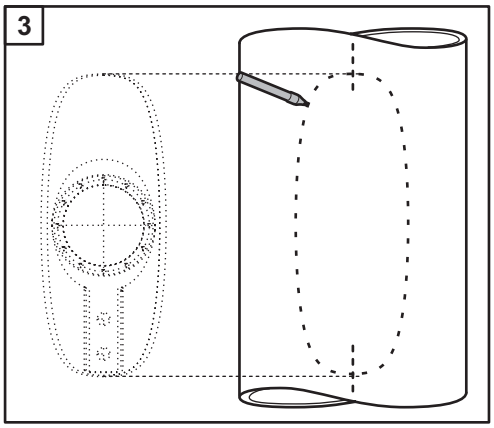
4.2 Saddle / Weld-in Stud / Measuring Vessel Installation

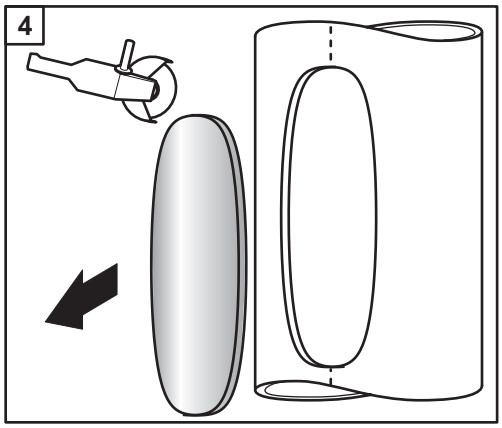
4.2.1 Saddle

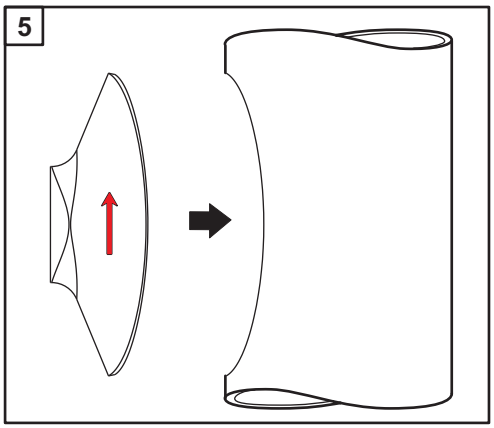
NOTE (N1)!
Ensure that the saddle has the right profile in relation to the pipe diameter, see attached drawing MEK-3000
Saddle profiling A010147.

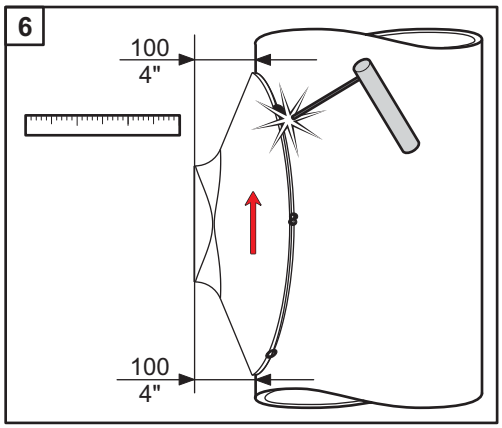


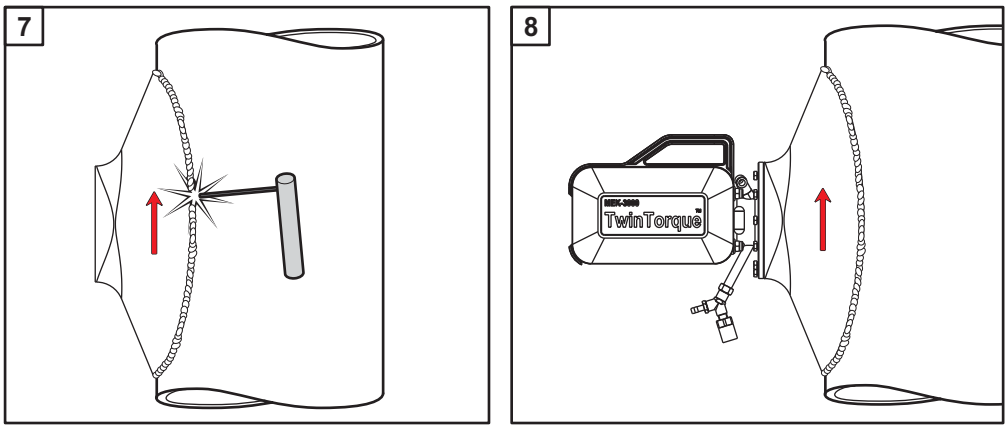






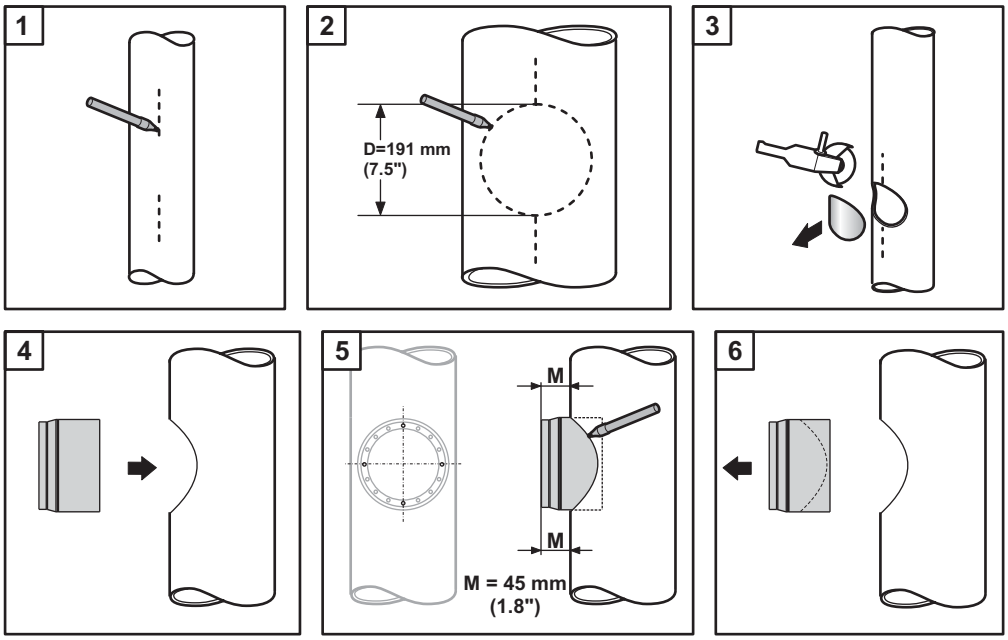




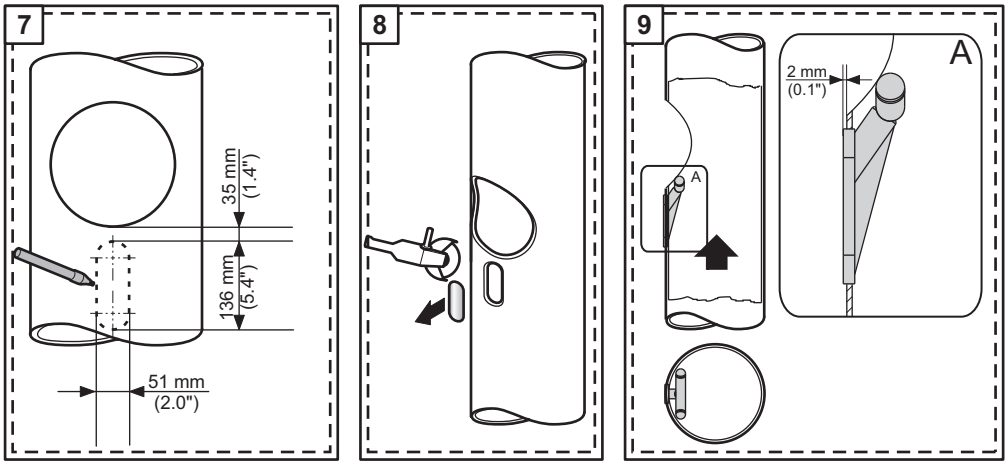

7
8
MEK-3000
TwinTorque

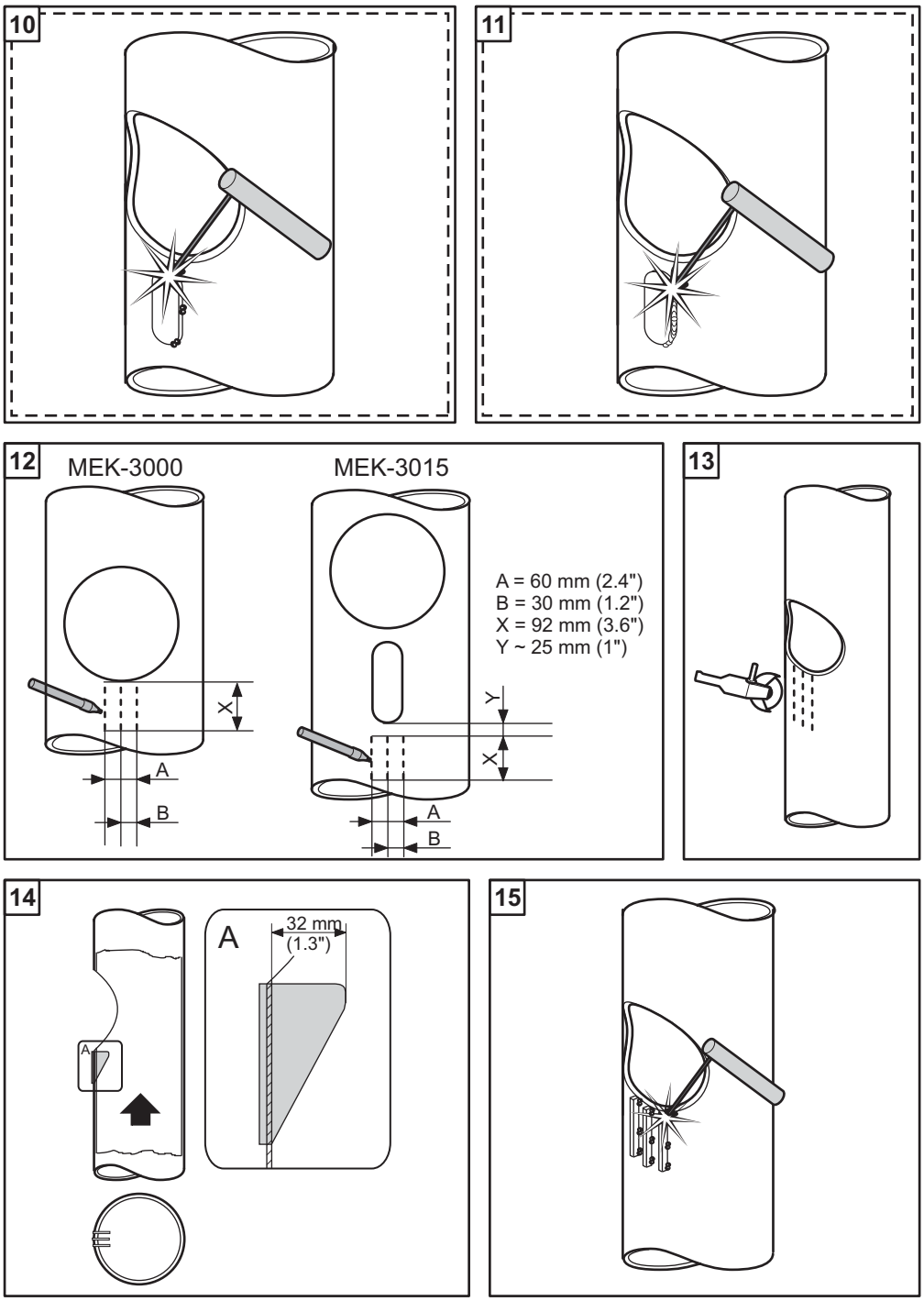
4.2.2 Weld-in Stud for Ø180 mm Flange

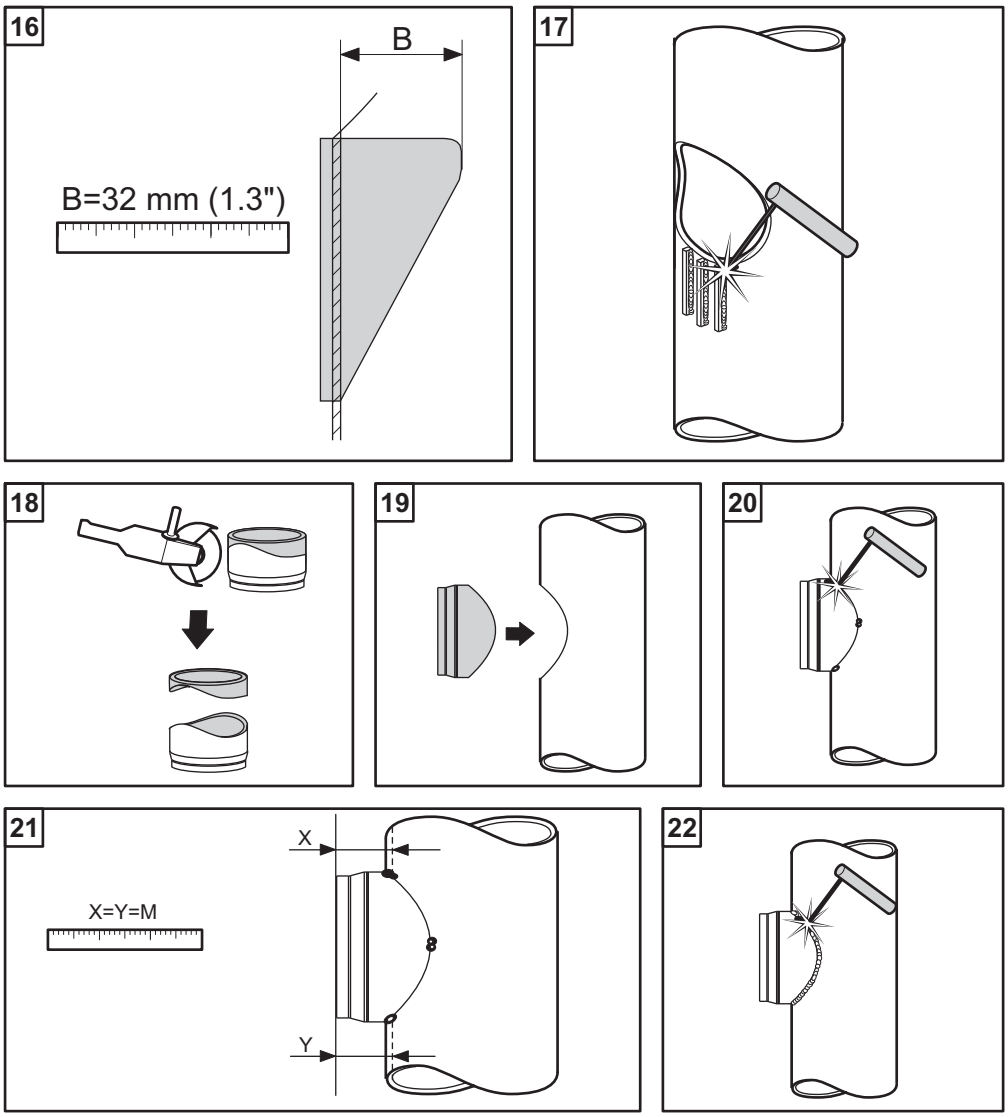
NOTE!
For installations where the pipe diameter is less than 200 mm, the pipe must be coned to a diameter above 200 mm before the weld-in stud can be installed.



NOTE!
Steps 7 to 11 are only applicable for transmitter model MEK-3015.

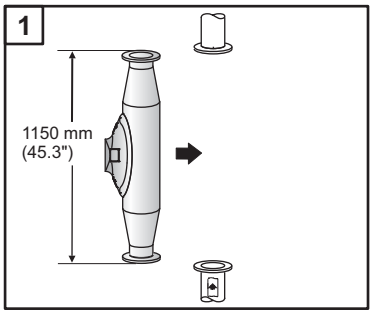


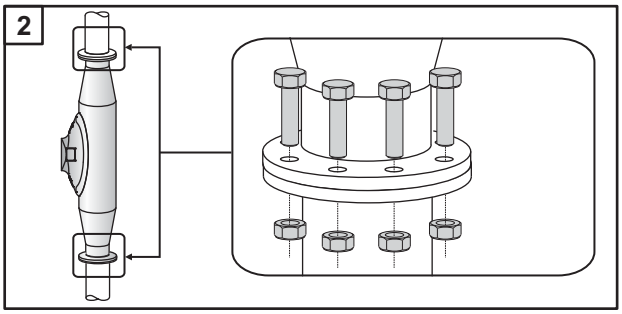

10
11
12
MEK-3000
MEK-3015
A = 60 mm (2.4")
B = 30 mm (1.2")
X = 92 mm (3.6")
Y ~ 25 mm (1")
X
A
B
Y
X
A
B
13
14
A
32 mm
(1.3")
A
15

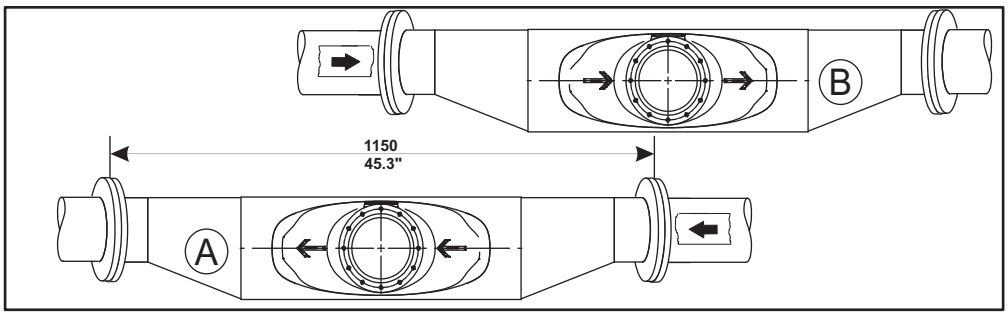


4.2.3 Measuring Vessel with Saddle

4.2.3.1 Flanged-end

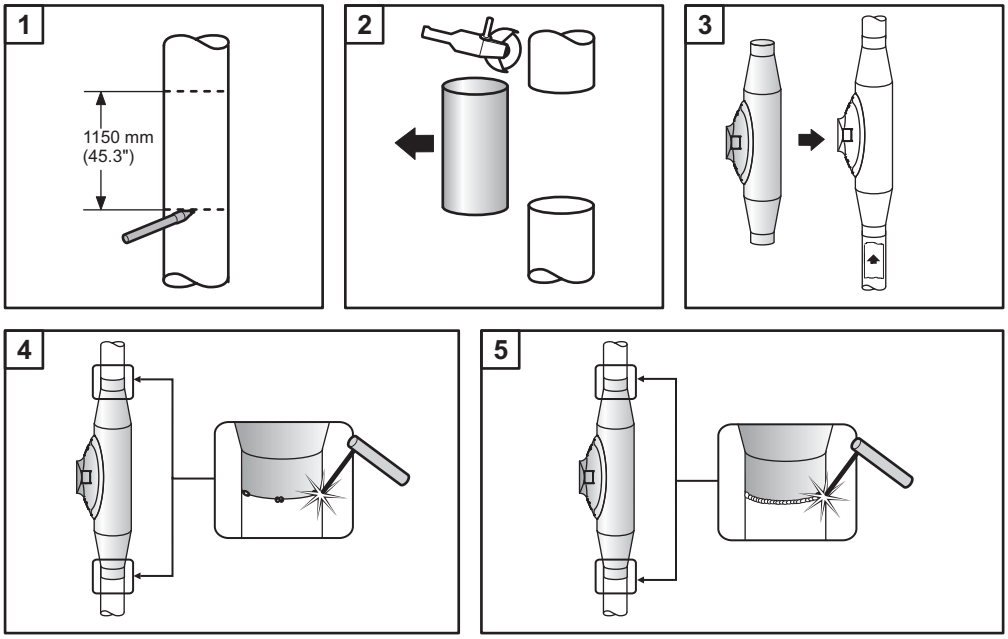




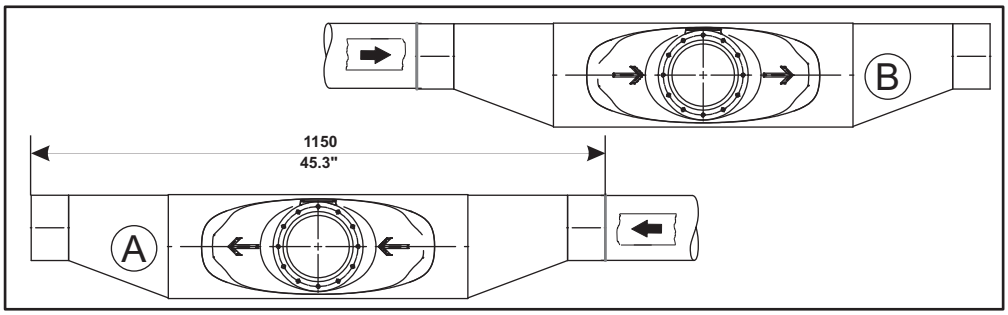


A = Left-hand design
B = Right-hand design

4.2.3.2 Weld-end

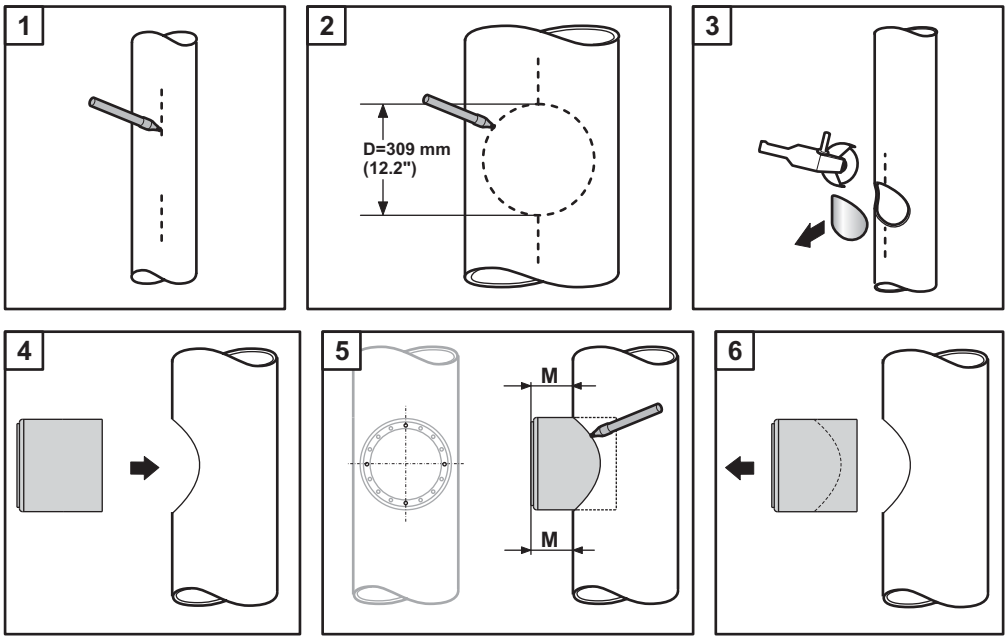


A = Left-hand design
B = Right-hand design

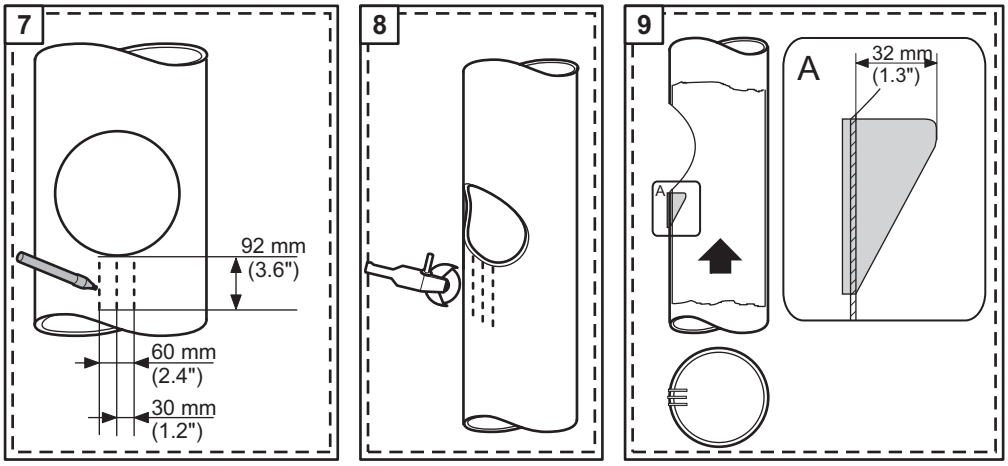


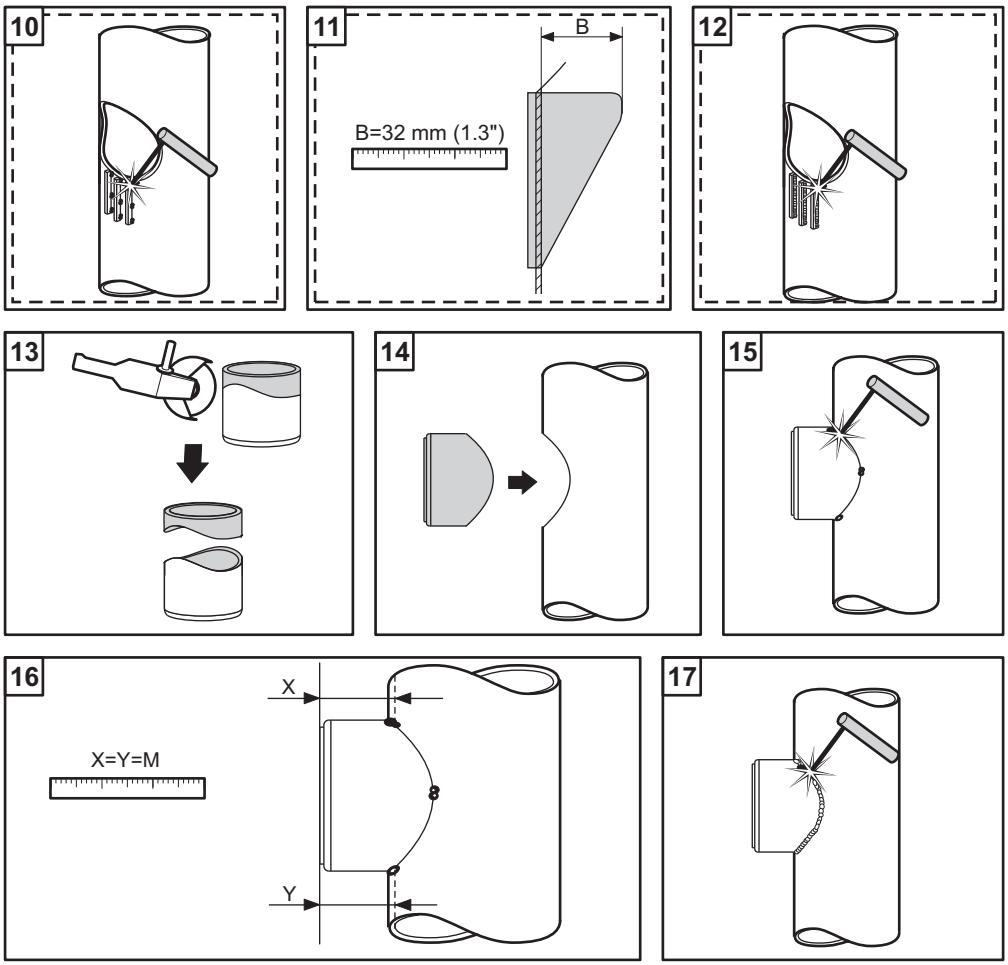
4.2.4 Weld-in Stud for Ø270 mm Flange

NOTE!
The M-measurement is measured from the inside of the pipe (step 5 in the figure below). It is determined in advance and may be either 70 or 150 mm (consistency, < 4% = 150, > 4% = 70).



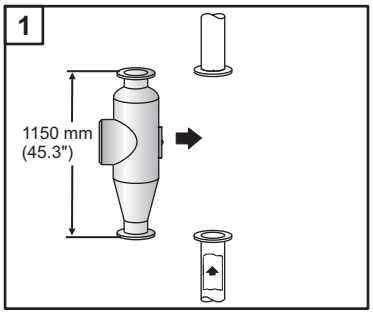
NOTE!
The installation of deflectors in steps 7 to 12 is only applicable in installations where M=70 mm.

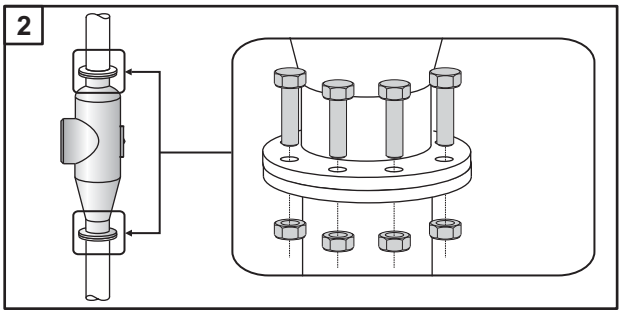


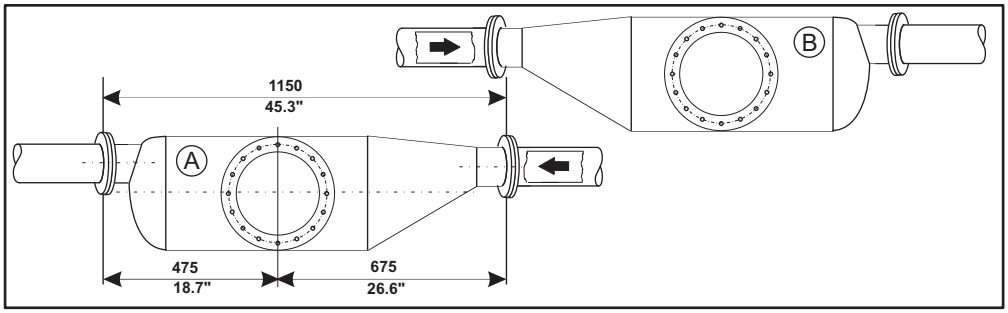


4.2.5 Measuring Vessel for Ø270 mm Flange

4.2.5.1 Flanged-end

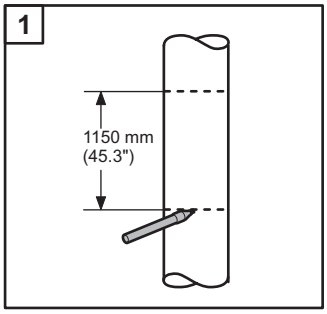


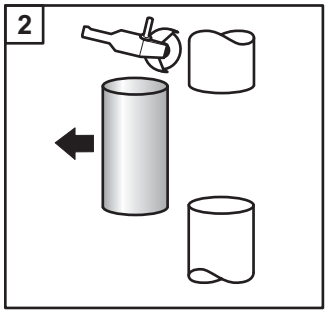


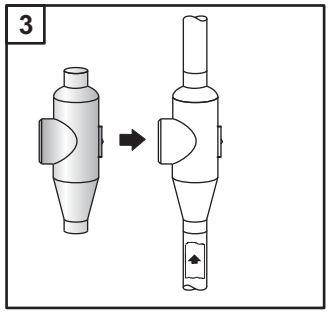


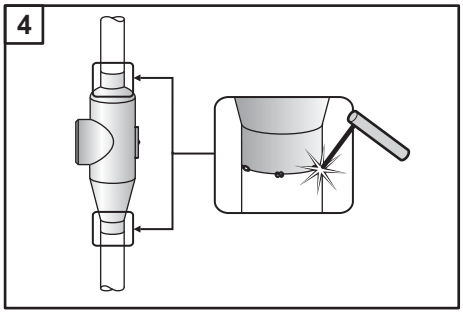
A = Left-hand design
B = Right-hand design

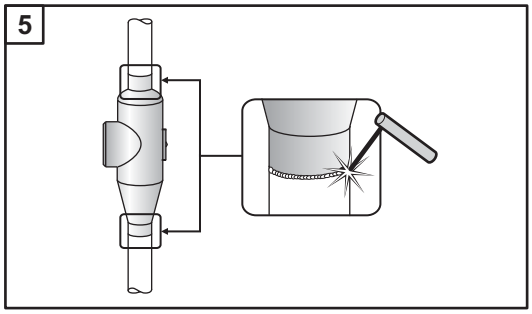
4.2.5.2 Weld-end



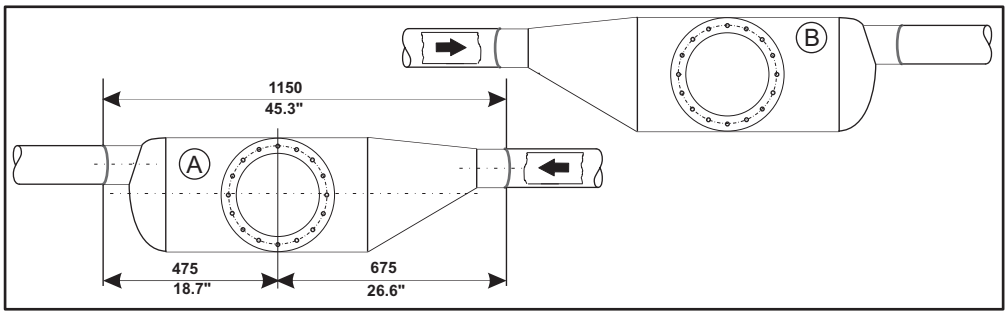








A = Left-hand design
B = Right-hand design



4.3 Mounting Instructions

4.3.1 Check Mechanical Sealing Movability

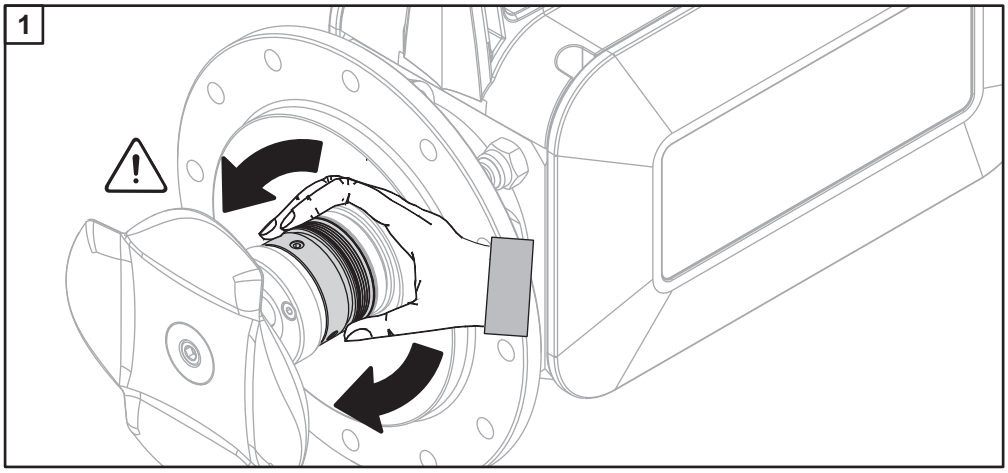
Tools required:
Flat screwdriver, large

Consumables required:
Water (drinking water quality)

Before mounting the transmitter, you must assure that the torque shaft and mechanical seal are not stuck and can be freely turned.

Try to turn the torque shaft and mechanical seal by hand according to step 1 below. If stuck, perform step 2-3.

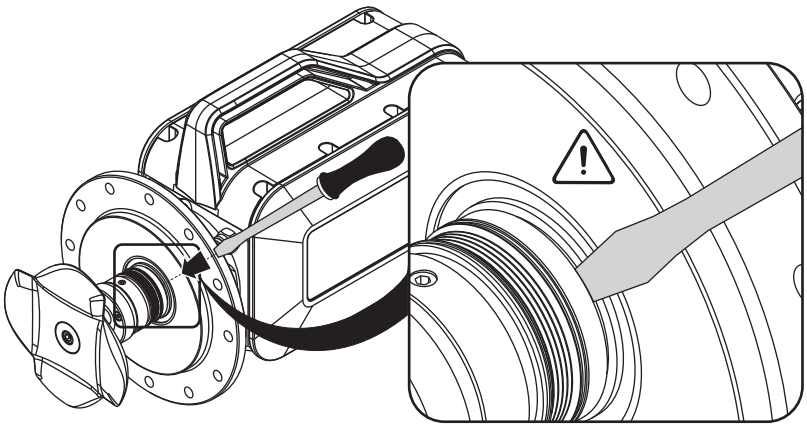
WARNING!
Do not hold the sensing element while turning the torque shaft.



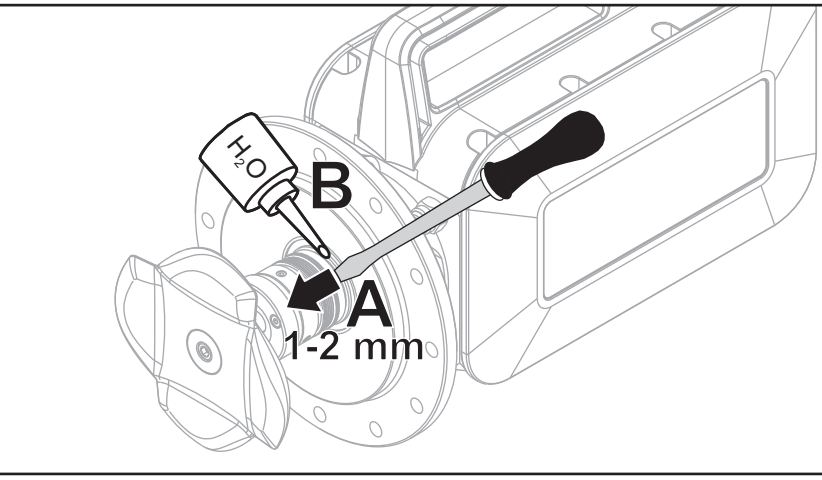
NOTE!
Step 2 and 3 below should only be performed if the mechanical seal cannot be turned by hand in step 1 above.

WARNING!
Be very careful to avoid damaging the mechanical seal ceramics while using the screwdriver. If the ceramics are damaged, the complete mechanical seal must be changed.
At the slightest doubt, contact BTG for assistance.

2



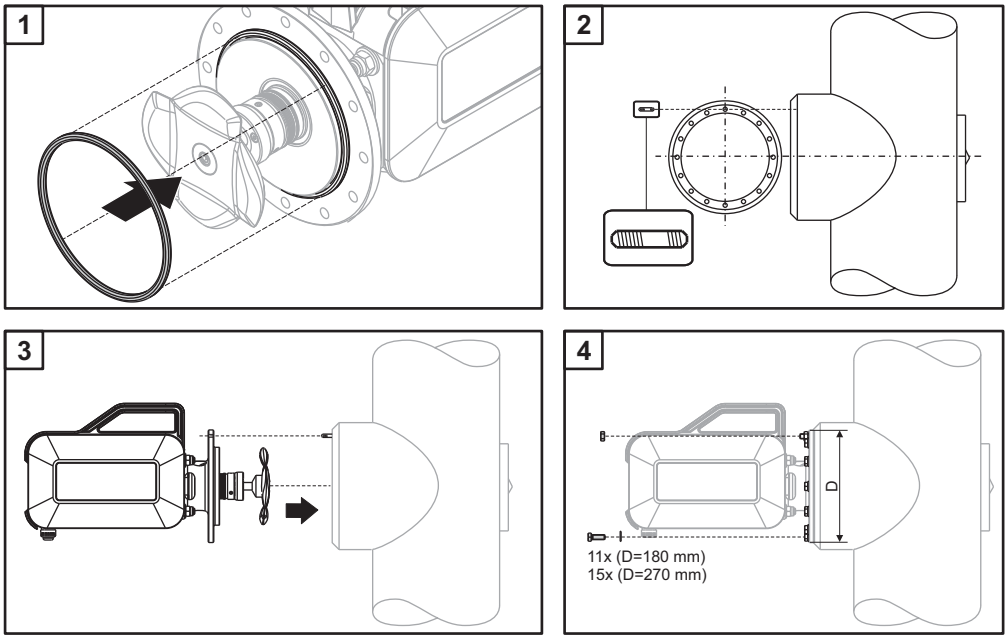
3



4.3.2 Mount the Transmitter

Tools required:
Block wrench, 13 mm

Parts required:
Mounting kit

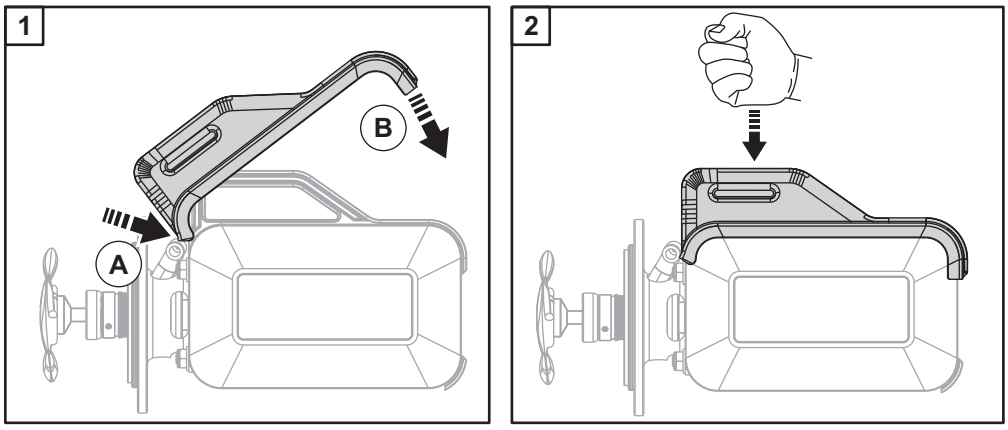


NOTE!
Tighten the screws to a torque of 17 Nm for M8.

With adapter flange (PN25) tighten to 33 Nm for M10.

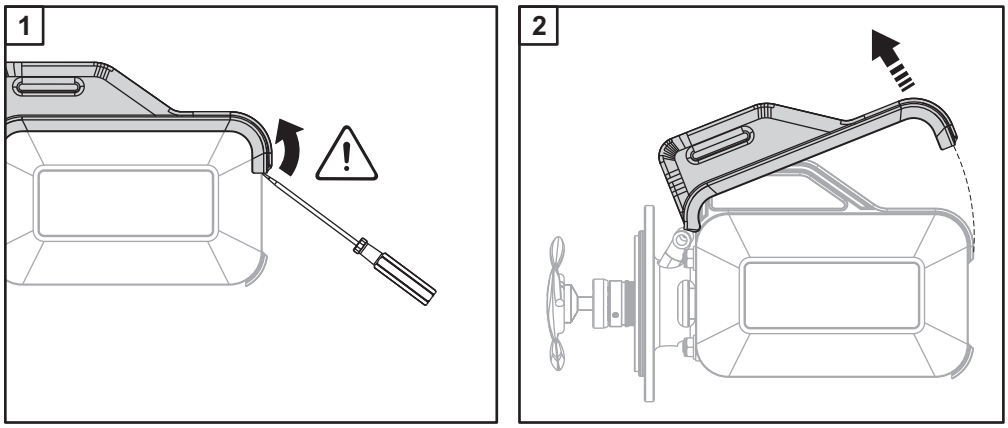
4.3.3 Mount / Dismount the Dirt Cap

Mounting



Dismounting

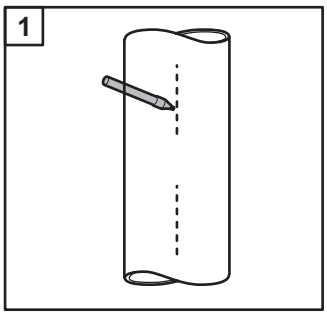
NOTE!
Be careful when using the screwdriver.

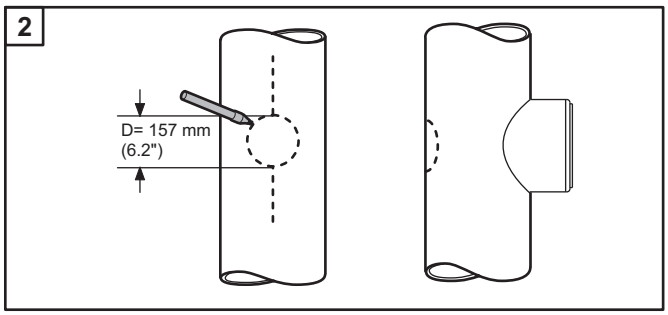


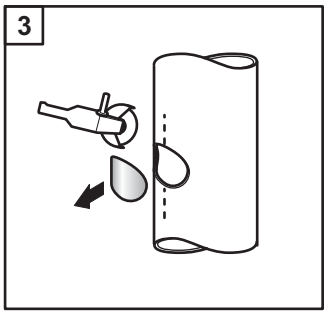
4.4 Mounting of Optional Accessories

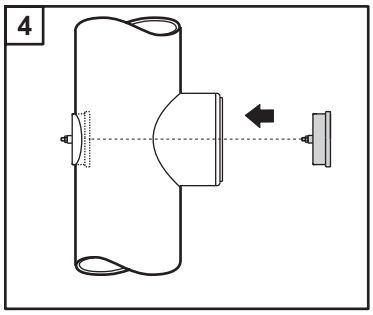
4.4.1 Inspection Cover

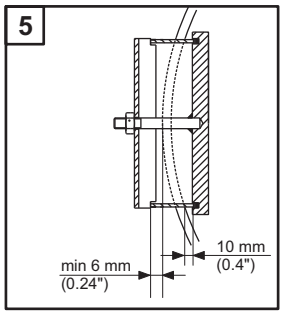
NOTE!
Inspection covers can only be installed in pipes with diameter ≥ 300 mm.

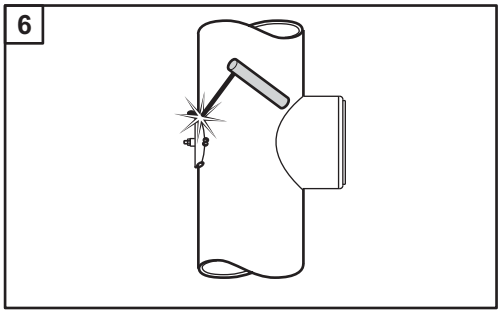


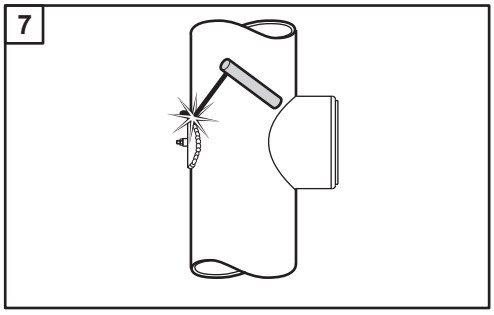












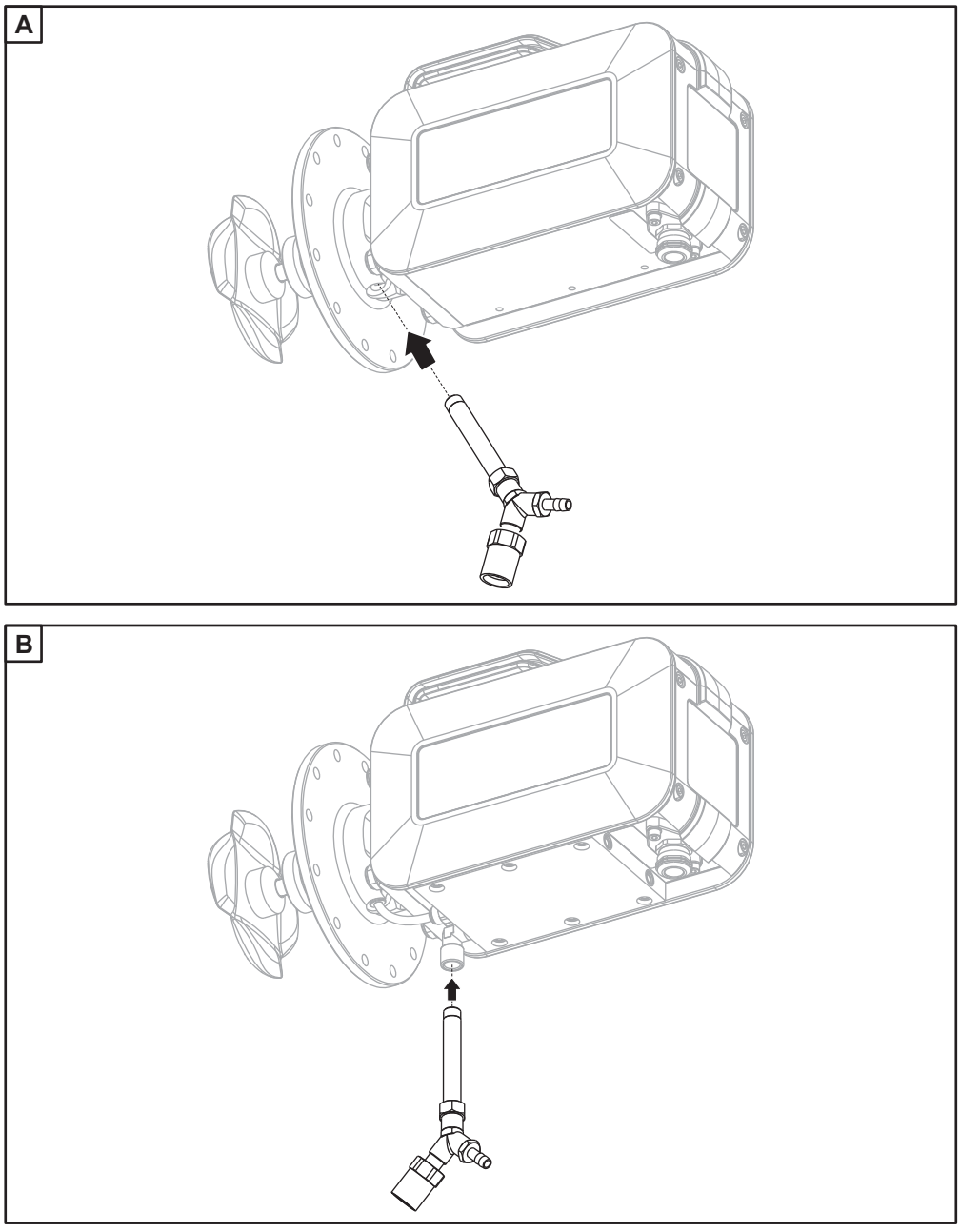
4.5 Connection Instructions

4.5.1 Flushing Water Connection

NOTE!
The flushing water must be of standard quality, with no impurities larger than 200 μm [8 thou]. Recommended flow is 0.5-1.5 l/min [0.13-0.4 gal/min]. Min. 0.5 bar [7 psi]

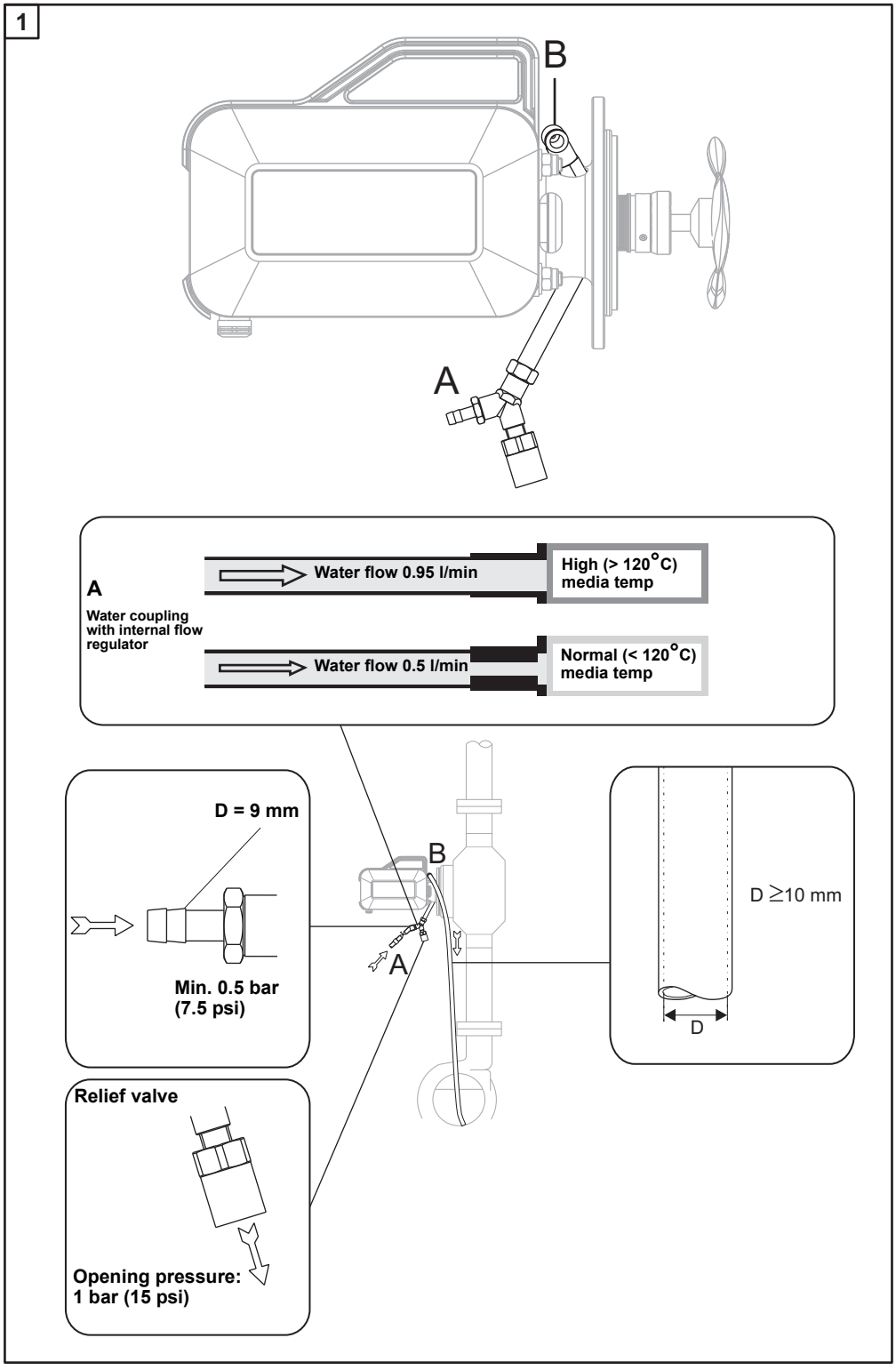
Fig 13 Flushing water pipe connection

A. Normal pipe connection
B. Pipe connection with cooling kit installed

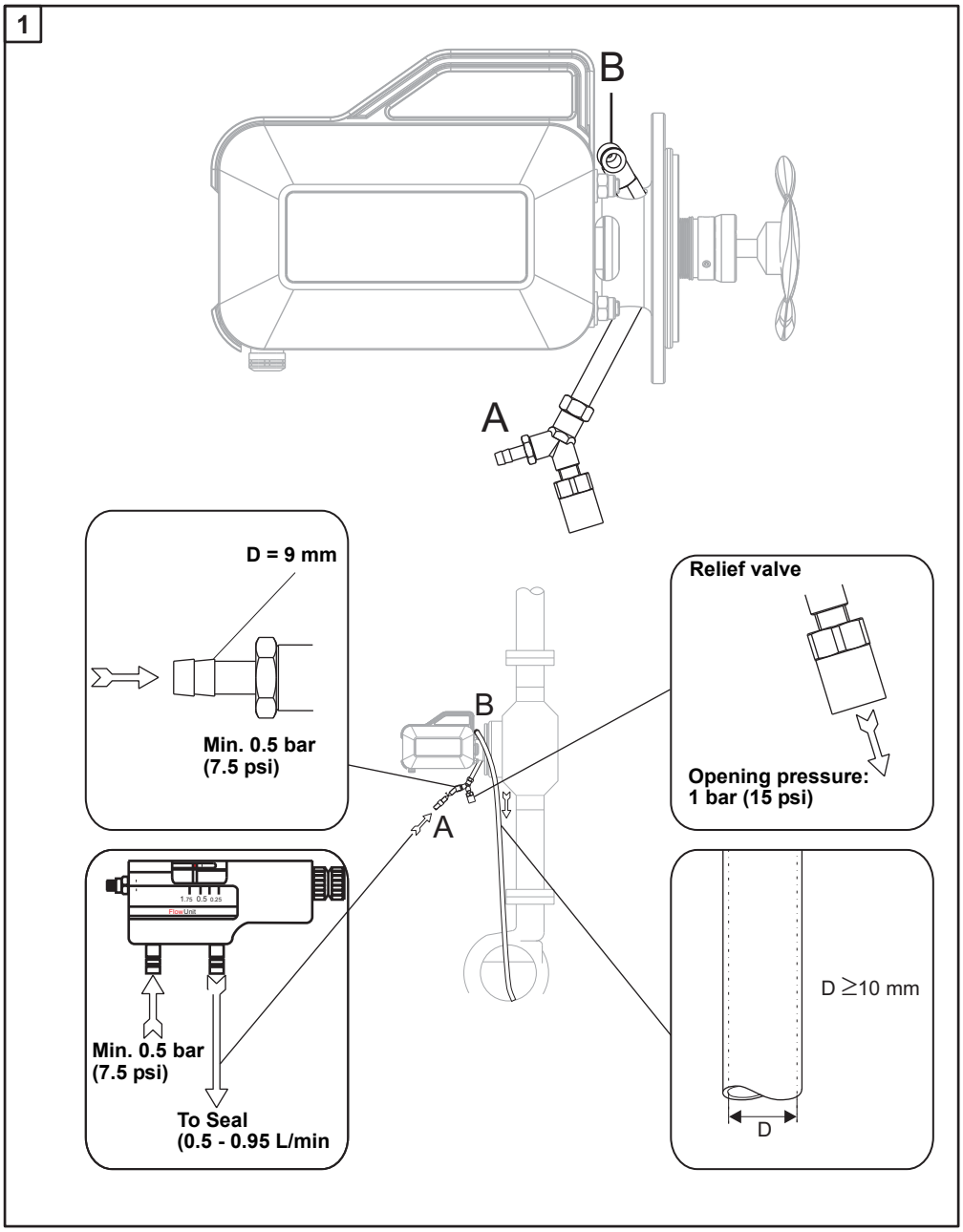


4.5.1.1 Internal Flow Regulator Connection

NOTE!
It is recommended to use an external flow regulator for the seal water, see section 4.5.1.2: *External Flow Regulator Connection*.



4.5.1.2 External Flow Regulator Connection

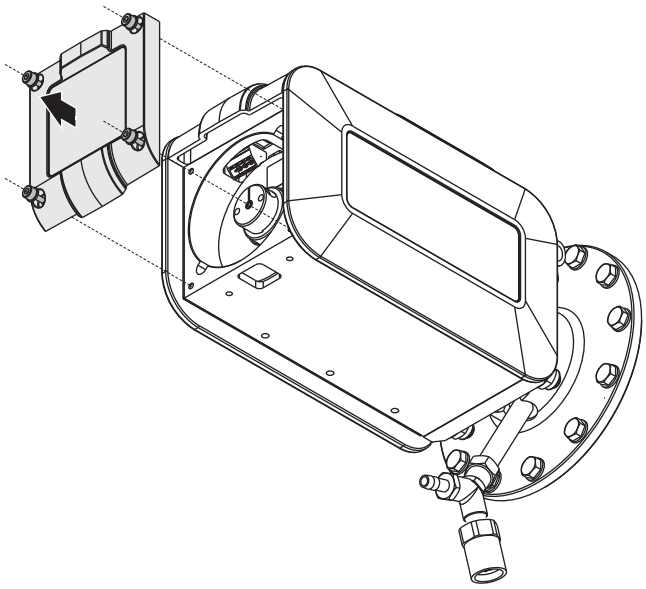


4.5.2 Electrical Connections

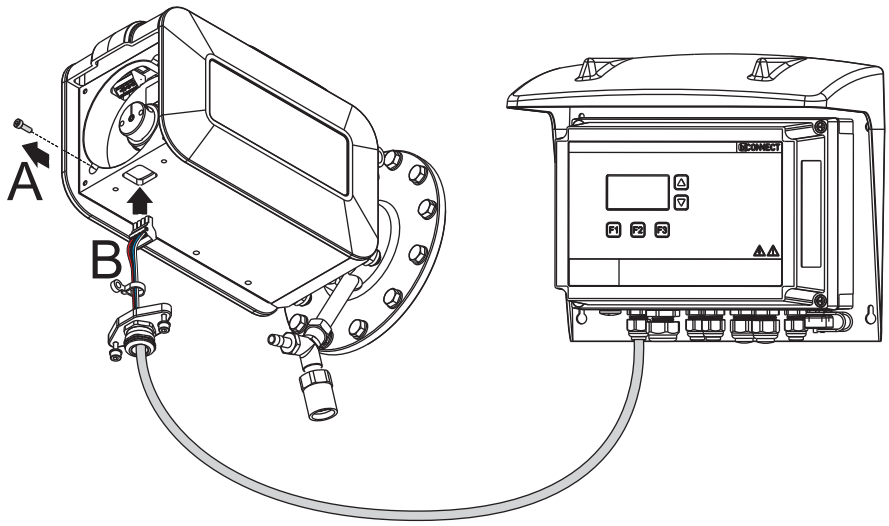
4.5.2.1 Connection of Communication Platform

Tools required:
Allen key, 3 mm, 4 mm

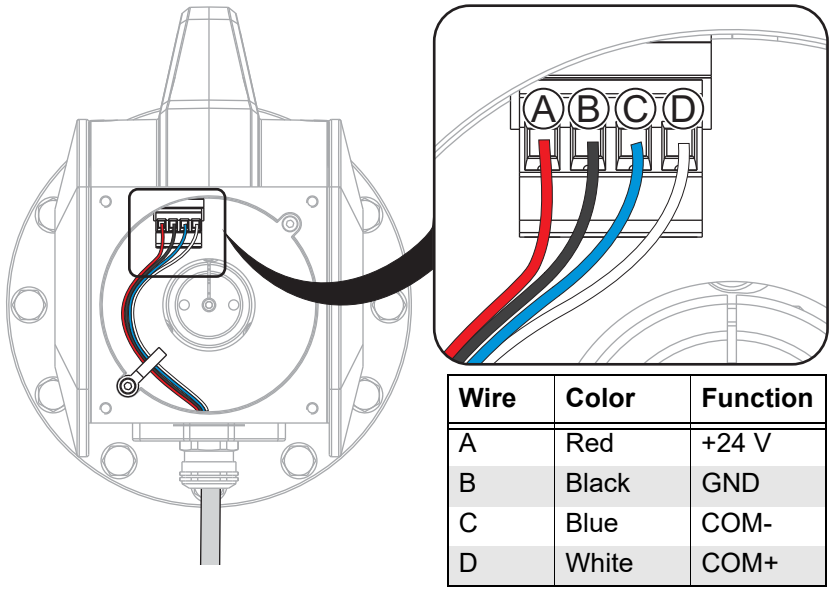
1



2

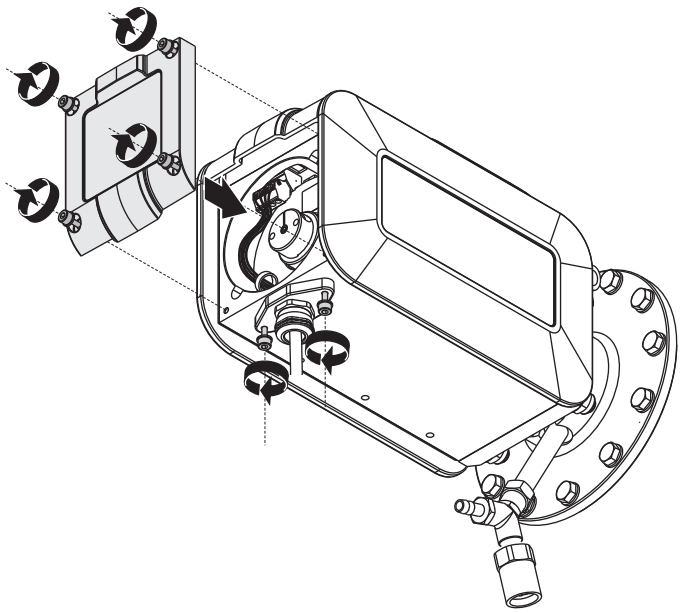


3



Wire	Color	Function
A	Red	+24 V
B	Black	GND
C	Blue	COM-
D	White	COM+

4



4.6 Communication Platform CPM

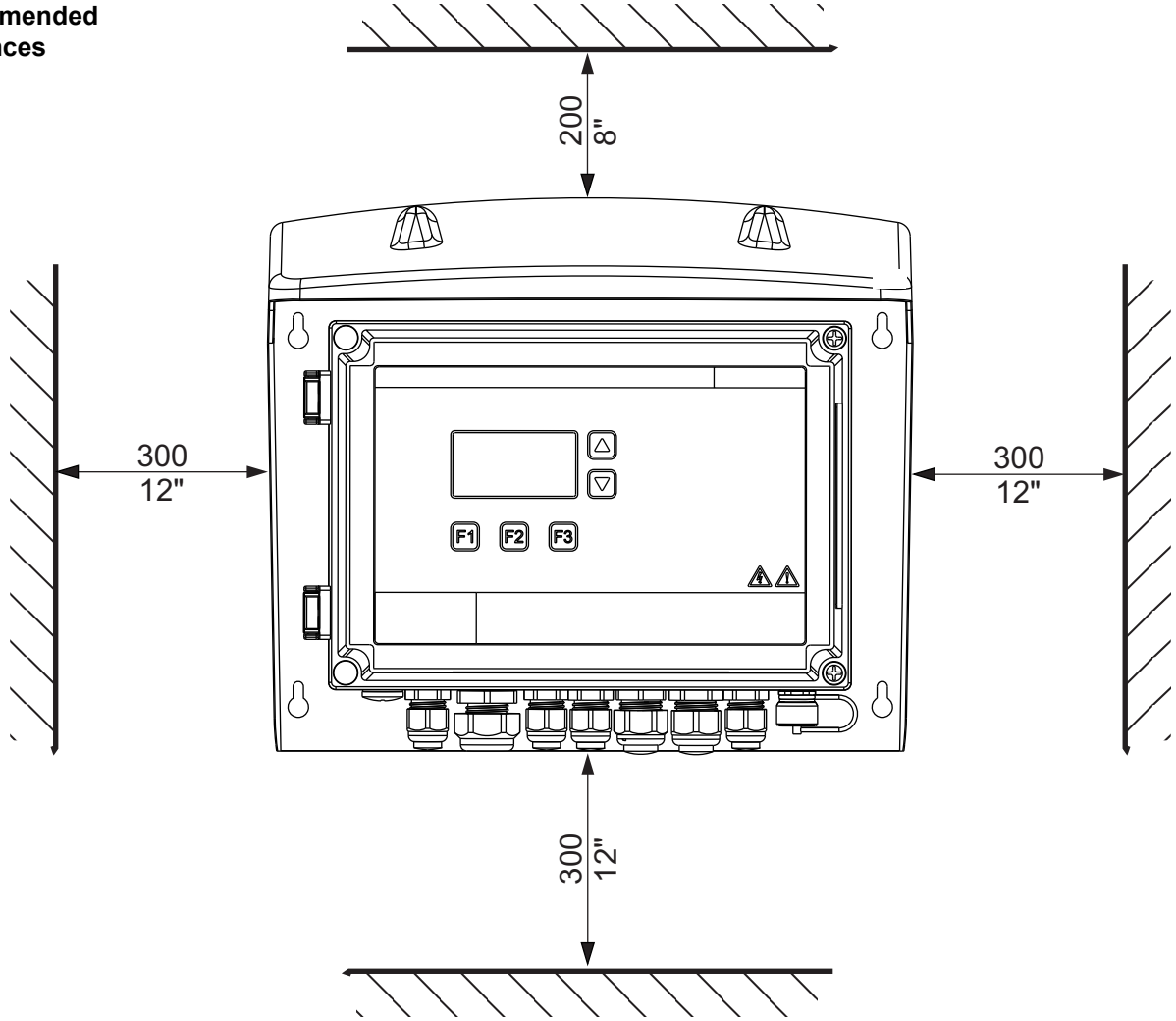
4.6.1 Mounting Instructions

Tools required:
Screwdriver Drilling machine

NOTE!
The CPM must be installed in an easily accessible position.

Mount the CPM in the selected location by fastening the protective cover to a flat surface. Use four suitable screws. See figure 14 for recommended clearances.

Fig 14 Recommended clearances



4.6.2 Cabling Instructions

NOTE!
BTG recommends that separate cables be used for analog and digital signals. Multi conductor cables can be used.

NOTE!
Unused cable glands must be sealed in order to fulfill the IP 65 requirement.

4.6.3 Connection Instructions

All electrical connections are made inside the CPM.

To access the terminal blocks, loosen the two screws on the right side of the front cover and open the CPM.

NOTE!
Secure all cables with cable ties to avoid short circuit.

4.6.3.1 AC Connection to Power Supply Unit

A specific instruction manual for the power supply unit can be found inside the CPM box.

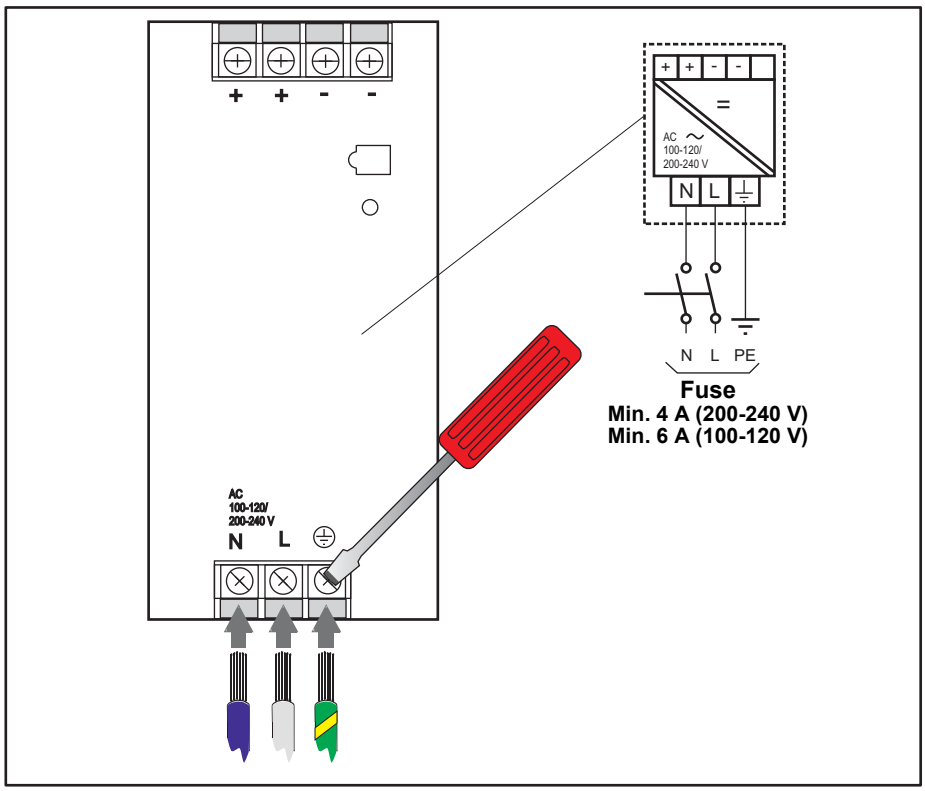
NOTE!
Before installation, ensure that all power to the system has been turned off. Cable connections must be made by authorized personnel.

NOTE!
Overcurrent protection is included in the power supply unit.

NOTE!
An external 2-pole switch close to the CPM is required as shown below (Not delivered from BTG).
The switch should be marked "Disconnecting device".

1. Insert the power supply cable through the cable gland.
2. Connect the AC cable (100 - 240 V AC, 50-60 Hz) to the power supply unit as shown below.

Fig 15 Connection of AC cable



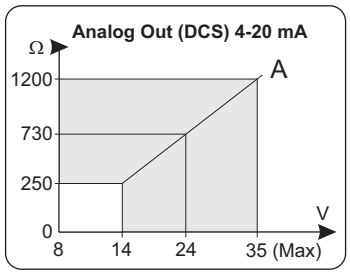
4.6.3.2 HCM Connections

The Hart communication module (HCM-80xx) is using HART® protocol.

NOTE!
Before installation, ensure that all power to the system has been turned off. Cable connections must be made by authorized personnel.

NOTE!
Figure 16 shows resistance as a function of supply voltage. The grey area is accepted. The resistance is the sum of cable- and power source- resistance in the current loop. The HART® communication requires a minimum resistance of 250 Ω.

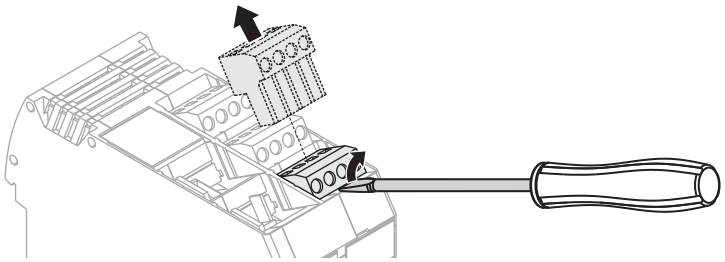
Fig 16 Analog Out 4-20 mA



1. Insert the signal cable through the cable gland.
2. Connect the cable to the HCM as shown on the following page.

NOTE!
The connection blocks can be released from the connection module for easier access, as shown in figure 17 below.

Fig 17 Releasing the connection blocks



3. Connect the shield to the upper connection point on the shield filter module (SFM-8000).

CAUTION!
The cable shield must always be connected to the upper connection point on the shield filter module, and kept separated from the transmitter cable shield.

HCM-8000 Connections

NOTE!
The functions of the connections for each instrument type can be found in the connection tables for HCM-8000 in the appendix of this manual

Fig 18 HART Communication Module HCM-8000

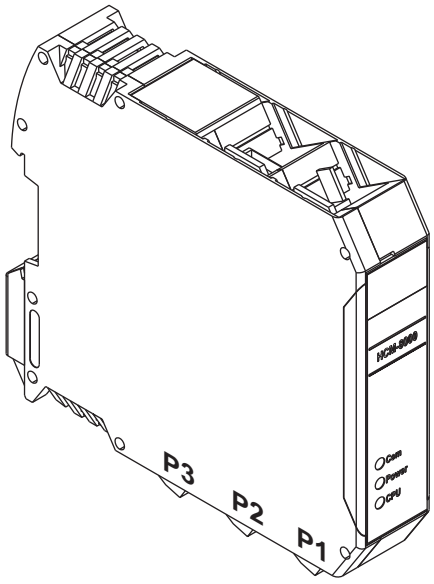
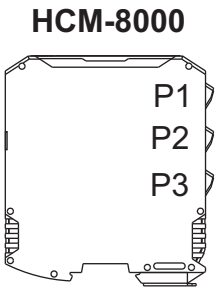


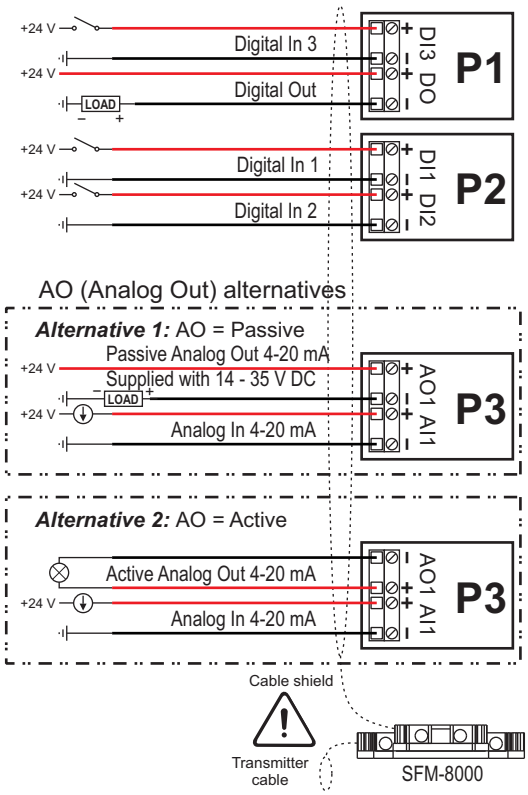
Fig 19 Connection of HCM-8000 cable



CAUTION!
The cable shield must always be connected to the upper connection point on the shield filter module, and kept separated from the transmitter cable shield.

NOTE!
Note the polarity for Passive or Active Analog Out (AO).

If the analog output signal (4-20 mA) is passive, an external source of current must be used (14-35 V DC)



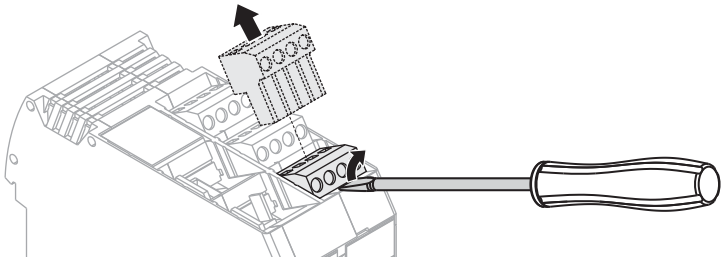
4.6.3.3 FCM Connections

NOTE!
Before installation, ensure that all power to the system has been turned off. Cable connections must be made by authorized personnel.

1. Insert the signal cables through the cable glands.
2. Connect the cables to the FCM-80 as shown on the following page.

NOTE!
The connection blocks can be released from the connection module for easier access, as shown in figure 20 below.

Fig 20 Releasing the connection blocks



3. Connect the shield to the upper connection point on the shield filter module.

CAUTION!
The cable shield must always be connected to the upper connection point on the shield filter module, and kept separated from the transmitter cable shield.

FCM-8000 Connections

NOTE!
The functions of the connections for each instrument type can be found in the connection tables for FCM-8000 in the appendix of this manual

Fig 21 Fieldbus Communication Module FCM-8000

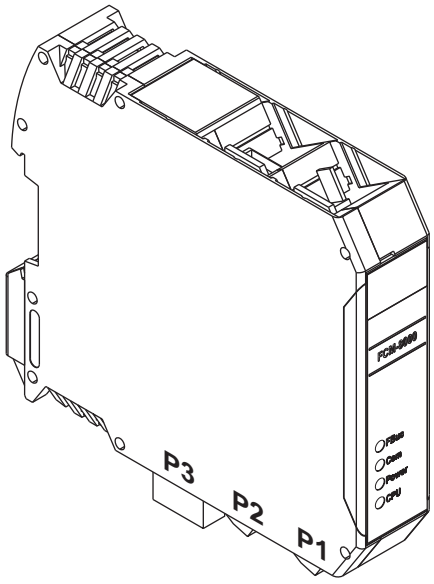
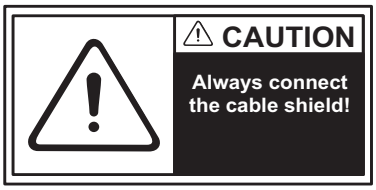
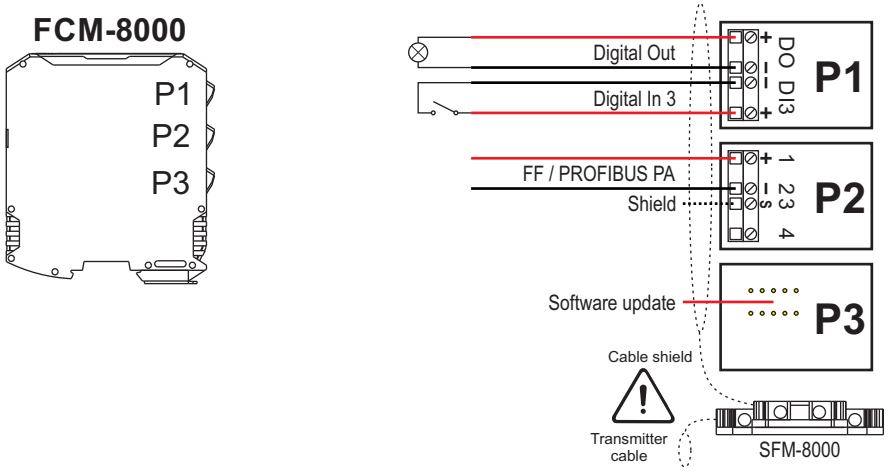


Fig 22 Connection of FCM-8000 cables



CAUTION!
The cable shield must always be connected to the upper connection point on the shield filter module, and kept separated from the transmitter cable shield.

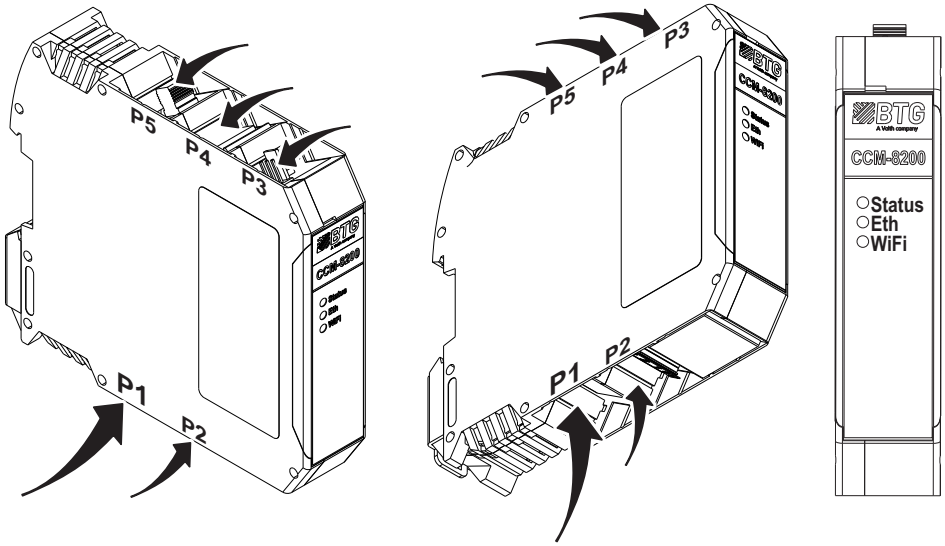


4.6.3.4 Communication Module CCM-8200

On CCM-8200 the ethernet interface RJ-45 connector is located at position 1. The USB connector P2 and the connectors P3 - P5 are for future options I

Fig 23 Communication Module CCM-8200

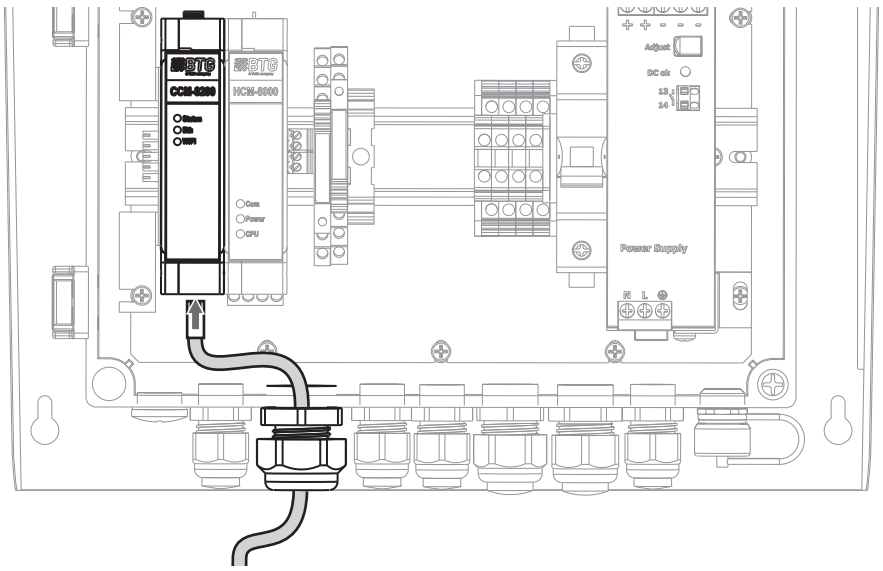
1. P1 RJ-45 connector
2. P2 USB connector (for future options)
3. P3 connector (for future options)
4. P4 connector (for future options)
5. P5 connector (for future options)



The status of the LEDs		
Status	On	Power is on
	Flashing	Instrument communication
Eth	On	Ethernet link has been established
	Flashing	Ethernet traffic
WiFi	On	Connected to WiFi access point

The ethernet cable to the CCM-8200 interface must go through the designated cable gland as shown below.

Fig 24 Ethernet cable to CCM-8200

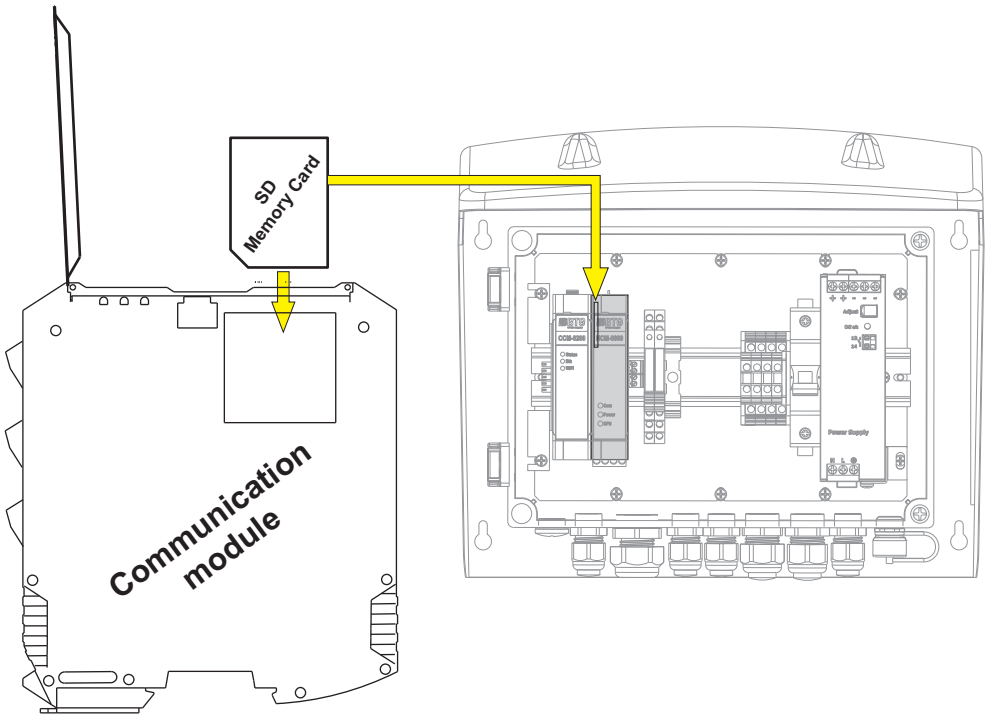


4.6.4 Backup Card

The HCM and FCM modules are equipped with a slot for a memory card of the type Secure Digital (SD).

All transmitter settings, transmitter data, and calibration data can be stored on a SD card. The SD card reader is located on the communication module card, and can be accessed by opening the front cover of the CPM (see figure 25).

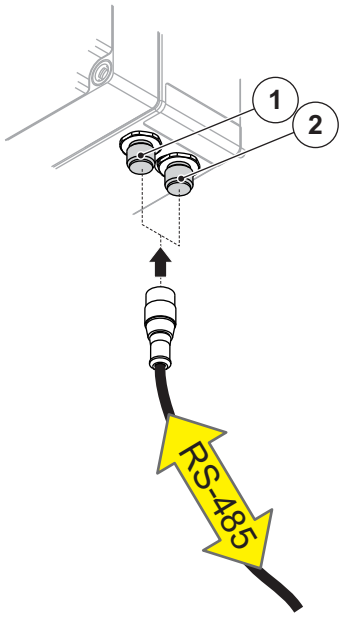
Fig 25 Location of SD card reader



4.6.5 RS-485 Connection

Fig 26 RS-485 connections

1. Software update and temporary communication
2. Primary communication; BTG Software



5 Operation Instructions

5.1 Commissioning

These steps should be carried out in chronological order to get the transmitter running when put into operation for the first time. The MEK-3000 must be installed in the pipe, and pulp must be admitted to the line, before step 8 and onwards are performed.

Most commissioning settings are made from the CPM communication platform. For more detailed descriptions of the CPM user interface and guidelines on how to use the CPM, see the CPM Operation Guide included with this manual.

1. **Check flushing water**

   Check that flushing water is supplied to the mechanical seal, and that the water is running off correctly to a drain.

2. **Power up the Communication Platform**
3. **Set time and date**

   For guidelines, see chapter 8.3.4: *Check Date and Time*.

4. **Check/change sensor type**

   Check that correct sensor type is specified according to order in the sensor configuration menu. If not, specify the correct sensor type.

   For guidelines, see section 8.6.3: *Sensor Configuration*.

   NOTE!
   This also affects upper and lower measuring range values (URV and LRV) and the default water value, which is stored in calibration sample 1. See the table below fore more information.

5. **Check/change upper and lower measuring range values**

   For guidelines, see the CPM operation guidelines for relevant communication module under section 8.6.2: *Output Configuration*.

6. **Set the Tag (the transmitter identification name)**

   For guidelines, see the CPM operation guidelines for relevant communication module under section 8.6.2: *Output Configuration*.

7. **Set sampling time**

   For MEK-3000, the sampling time can be set between 5 and 50 seconds.

   For guidelines, see section 8.6.1: *General Configuration*.

8. **Take calibration samples**

   For a basic calibration, with pre-defined calibration constants, a single sample is required to check if there is a need of an offset adjustment.

   For a lab calibration, a single sample can be used to get started quickly and obtain a correct calibration at the present consistency level, but for a more exact calibration, multiple samples at various consistency levels are required. Additional samples can be added at any time to improve an existing lab calibration. The MEK-3000 can store maximum eight sample values.

   At delivery, the first sample position is enabled and contains a nominal water value sample. You can choose to use this sample in future calibrations, to disable the sample, or to delete it and take a new water sample. The first sample position is however dedicated for a water value sample, so it is not possible to enter a lab value for this sample.

   For sampling guidelines, see section 8.4.4: *Take Sample*.

9. **Calibrate the transmitter**

   - **Basic calibration:**
     Check that correct pulp type is specified according to order. If not, specify the correct pulp type. See section section 7.6: *Pulp Types* for a list of available pulp types.

   NOTE!
   Changing pulp type will overwrite the calibration constants in the present passive Calibration Set to the default values of a pre-defined calibration. Also note that correct sensor type must be specified before changing the pulp type, since this affects the selection of pre-defined calibration. If the desired combination of sensor type and pulp type are not found in the pre-defined calibration list, a default setting will be selected.

   For guidelines, see section 8.5.3: *Basic Calibration*.

   - **Lab calibration:**
     For lab calibration instructions, using calibration samples, see section 8.5.4: *Lab Calibration*.

10. **Set Time constant (Damping)**

    The time constant is set after calibration has been completed. Set it so that the signal is stable, normally at 2 to 10 seconds. If you find you have to set a very long time constant because the feedback signal is unsteady, the transmitter is probably working in an unstable, poorly mixed pulp flow. In such a case you should consider:

    - Relocating the transmitter farther away from the pump.
    - Improving the remixing system or the supply of dilution water, etc.

    If the time constant is too long, the high precision level of the transmitter is reduced. Contact BTG for further advice.

    For guidelines, see section 8.6.1: *General Configuration*.

11. Configure alarm and warning settings

All available alarm and warning functions are described in .

Configure the alarms and warnings according to your requirements. For guidelines, see section 8.7.2: *Configure Alarm Settings* and section 8.7.3: *Configure Warning Settings*.

12. Adjust Offset

If a deviation from laboratory values is detected during regular monitoring of the transmitter, an offset adjustment, which is a zero point displacement, can be performed to correct the error. Note however that the deviation should be verified by several laboratory samples before carrying out offset adjustment.

For instructions, see section 8.6.1: *General Configuration*.

13. Document calibration and transmitter settings

After the transmitter has been configured and calibrated, all transmitter settings and calibration data should be documented to prevent the risk of accidental data loss. Documentation is preferably performed using the backup function of the CPM Communication Platform. For guidelines, see section 8.8.1: *Store Data on a Memory Card*.

Documentation can also be made manually by filling in the documentation form in section 7.7: *MEK-3000 Documentation Form*.

6 Service Instructions

6.1 Maintenance Recommendations

6.1.1 Regular Maintenance of the Transmitter

Maintenance needs will depend on the transmitter position, media influence, and ambient conditions.

Regular maintenance includes:

- Weekly inspection of flushing water and possible leakage.
- Semi-annual inspection of wetted rubber details and metal parts for damage, if exposed to aggressive chemicals.

Long-term maintenance includes:

- Replacement of rotating drive shaft ball bearings after approx. 10 years operation.
- Replacement of mechanical sealing and secondary shaft seal typically after 5 years operation, depending on operating conditions.

6.1.2 General Maintenance Advice

Cleaning the Transmitter

Do not expose the transmitter to high water-pressure during cleaning. Use a soft brush and if necessary dishwashing detergent – avoid strong solvents.

Maintenance on Sensing Element

Change the sensing element if the consistency range changes.
Most sensing elements are hollow to reduce weight and improve sensitivity. Prolonged wear in some types of pulp can result in leakage so that the sensing element is filled with liquid. If this occurs, it should be changed to maintain precision unless an increase of signal noise is acceptable. The sensing element can also be emptied, repaired by welding and tested for leaks in hot water.

The insert thread of the torque shaft, where the sensing element is mounted, can also be damaged by careless handling in which case it should be changed.

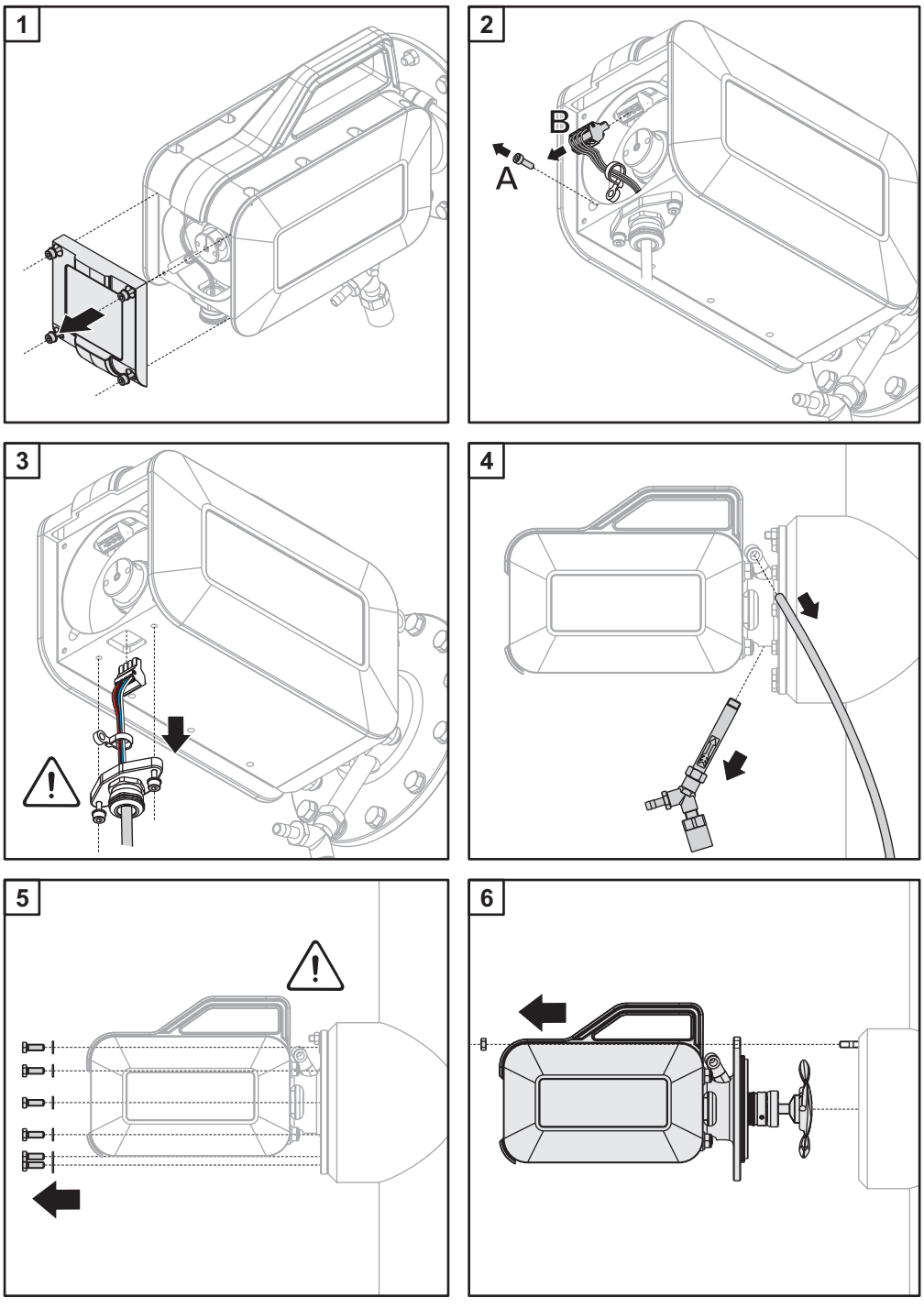
Maintenance on Mechanical Face Seal

The mechanical face seal is subject to wear. It normally lasts for several years, but can fail after a short time. If so, check the water supply, check that the seat is perpendicular to the shaft, and check that the seal was not damaged when the transmitter was installed (see label on transmitter). If the seal has been removed during service of other parts, it cannot be reused if its seats are worn relative to each other as leakage is likely if reassembled. It can however be reused if the seats are only slightly worn.

6.2 Service Actions

6.2.1 Removing the Transmitter from the Pipe

Tools required:
Block wrench, 13 mm Allen key, 3 mm, 4 mm



NOTE!
While performing step 3, check the condition of the O-ring in the cable gland holder. If defect, change the O-ring. New O-rings are available from BTG with part number P27017029

6.2.2 Changing O-rings and Sealings

Parts required:
Sealing Kit (see spare part list)

All O-rings and sealings that need to be changed on a regular basis are collected in a service kit as shown in figure 27 below.

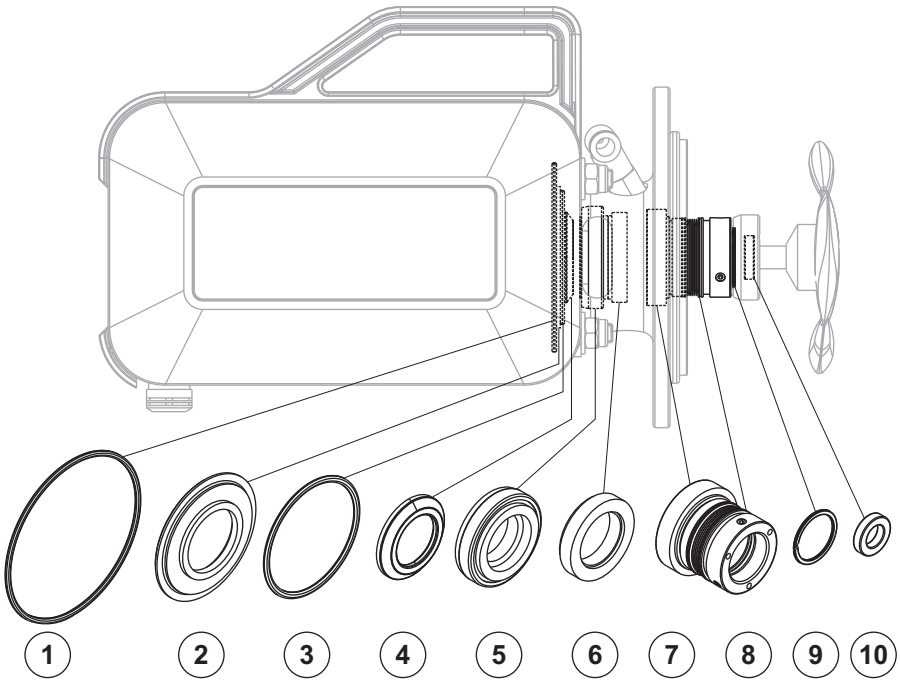
A Secondary Sealing Kit, containing only the Secondary sealing (5) and spiral retaining ring (4), is also available.

Instructions for changing the O-rings and sealings are available in separate service kit manuals, which are included in the service kits.

See section 9.1: *Spare Parts* for service kit part numbers.

Fig 27 Sealing kit

1. O-ring Ø94.5x3
2. Wearing washer
3. O-ring Ø64.5x3
4. Gamma ring
5. Secondary sealing, rotating part
6. Secondary sealing, static part
7. Mechanical sealing, static part
8. Mechanical sealing, rotating part
9. Spiral retaining ring
10. O-ring Ø12x5.7



6.2.3 Changing the Electronics Card

Parts required:
Electronics Card kit (see spare part list)

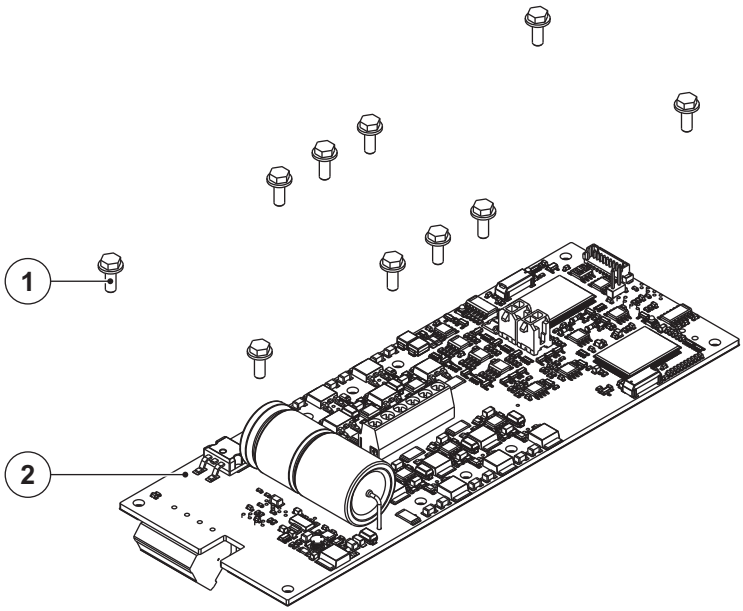
A service kit for changing the electronics card is available. The included parts are shown in figure 28 below.

Instructions for changing the electronics card are available in a separate service kit manual, which in included in the Electronics card kit.

See section 9.1: *Spare Parts* for service kit part numbers

Fig 28 Electronics card kit

1. 10 x Screws
2. Electronics card



6.2.4 Changing Sensing Element and Propeller/ Hub

For instructions on how to remove and mount the sensing element and the propeller/hub, see appropriate steps in section 6.2.5: *Changing the Flange*.

NOTE!
After the sensing element and propeller/hub have been changed, the sensing element type, sensing element number, and propeller number must be updated in the CPM. See the CPM Operation Guide, section 8.6.3: *Sensor Configuration*, for further instructions.

6.2.5 Changing the Flange

NOTE!
The instructions in this section show how to change from a Ø180 to a Ø270 mm flange, but are also valid when changing from a Ø270 to a Ø180 mm flange as well.

6.2.5.1 Reading the Feedb (Feed Back) value (serial number < 44800000)

This procedure should only be performed if the serial number is < 44800000. If any uncertainties, please contact BTG Service.

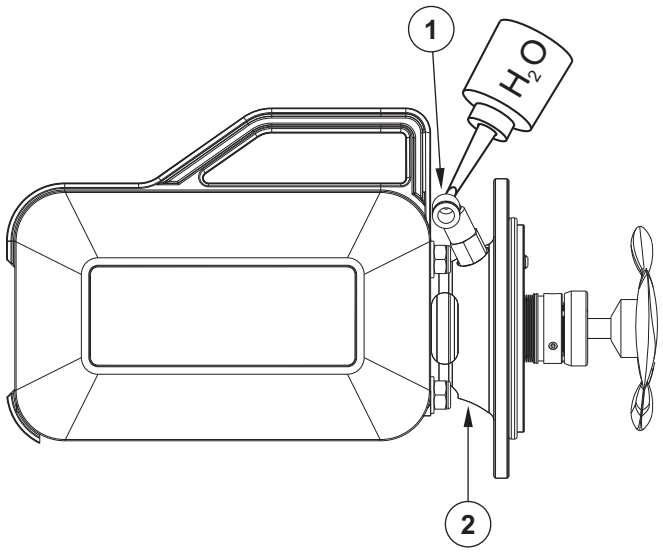
Before starting any service work, make sure that:

- The serial number on the transmitter is < 44800000.
- Transmitter is removed from pipe, see section 3.2.1, and cleaned.
- Work is done at a suitable work station.
- 100-120/200-240 VAC power and a CPM-1400 communication platform is available at the work station.

Preparations

Fig 29 Preparations

1. Outlet water coupling
2. Flushing water inlet



1. Put a plug (¼ thread) in the Flushing water inlet (2).
2. Fill the Flushing water chamber with water through the outlet water coupling (1), using a water bottle with a spout.

   NOTE!
   Make sure that no air is left in the Flushing water chamber. It can damage the sealings.

3. Connect the CPM and start the transmitter. See section 4.5.2: *Electrical Connections*.

Reading the Feedb value

1. Let the transmitter run for approximately 10 minutes.

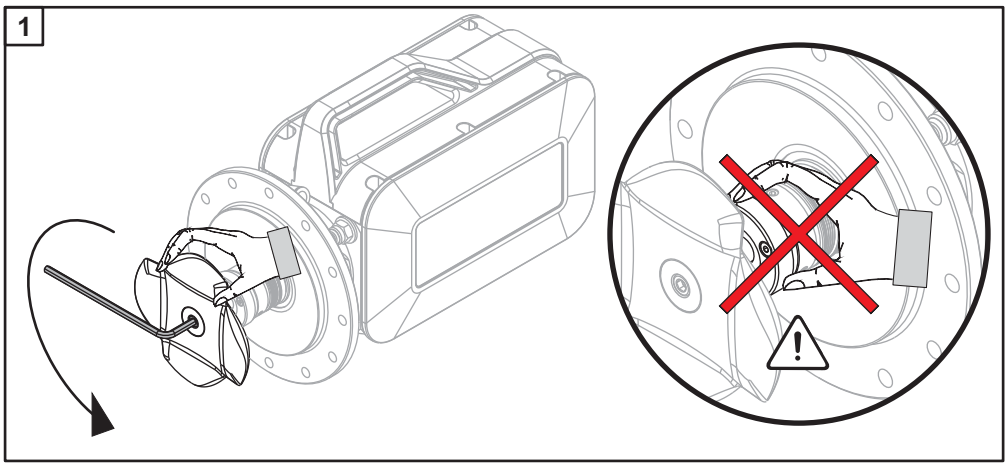
   NOTE!
   The transmitter should not be run unattended. Add water in the Flushing water chamber if the water level sinks.

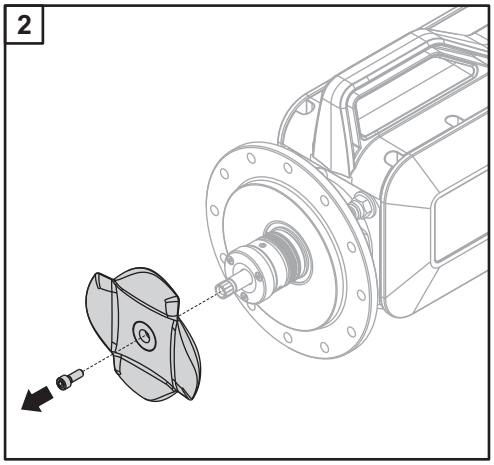
2. Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb value and note it for later use, when assembling the flange.

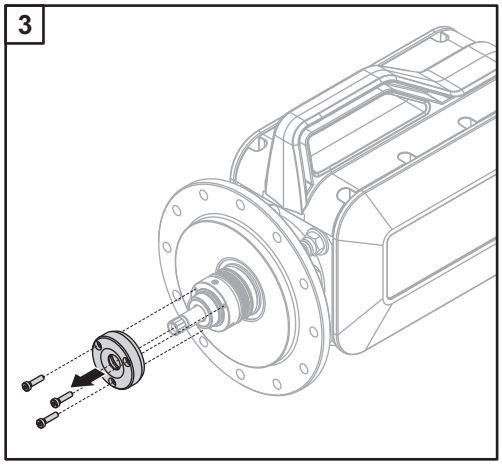
6.2.5.2 Removing the Flange

Tools required:
Allen key, 2,5 mm, 5mm Block wrench, 16 mm

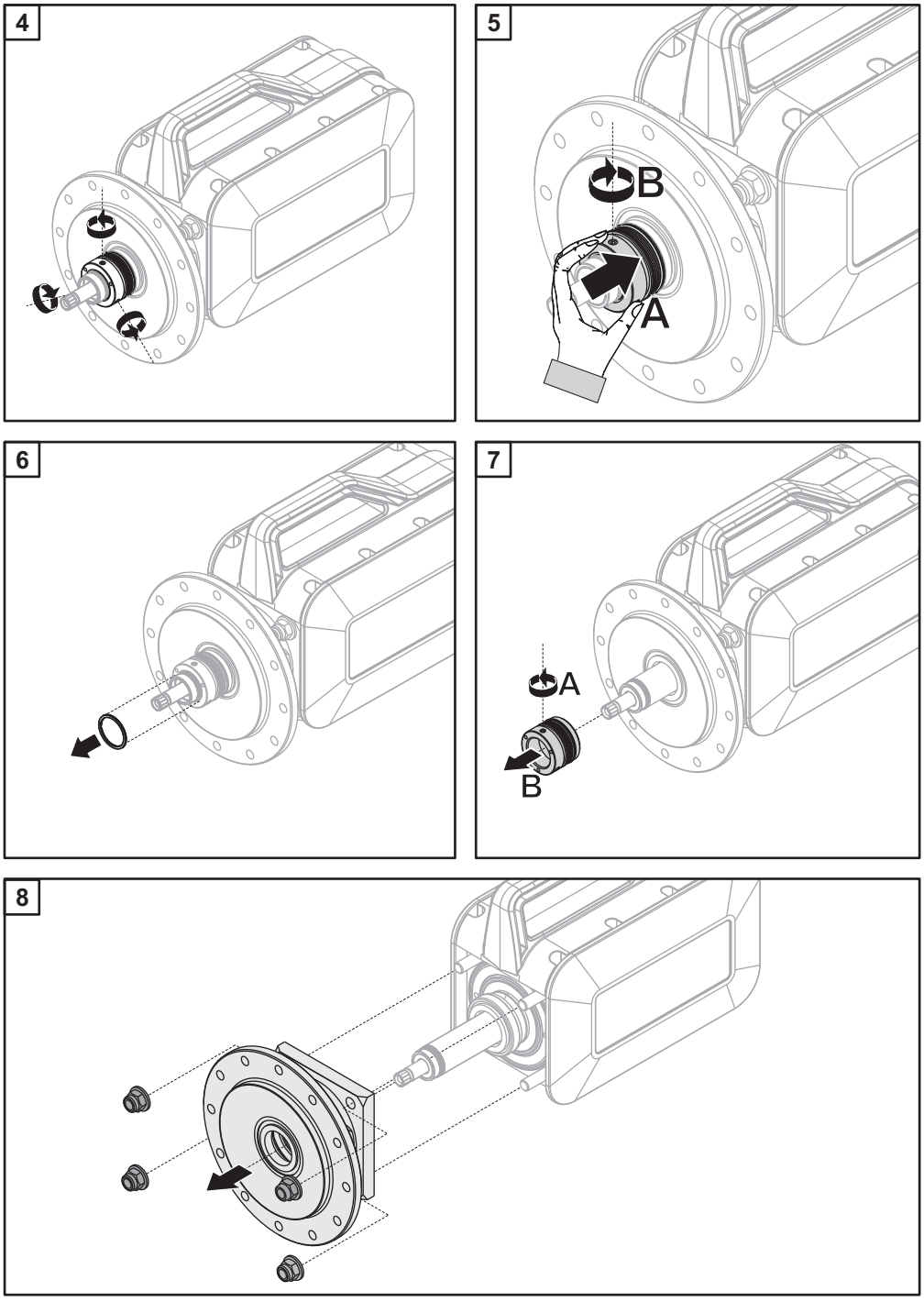
WARNING!
Hold the sensing element only, **not the hub or propeller**, while loosening the screw.







NOTE!
Remove the O-ring carefully, to prevent the Feedb value to change.



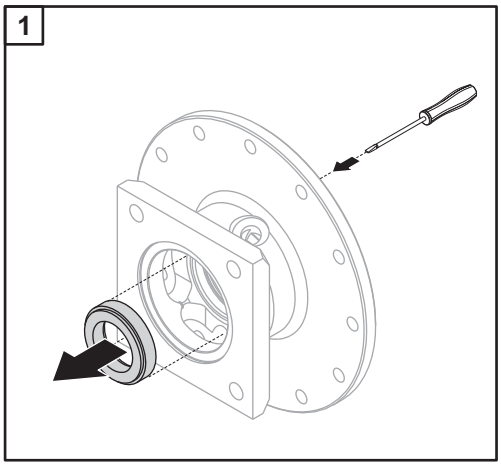
6.2.5.3 Removing the Mechanical and Secondary Sealings

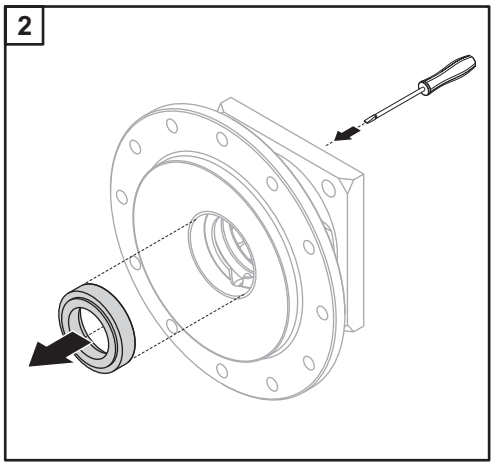
This instruction is only applicable if the sealings from the old flange are to be re-used with the new flange.

The sealings can only be re-used if they never have been used in operation.

NOTE!
Never re-use a mechanical sealing that previously has been in operation.

Tools required:
Flat screwdriver, medium size



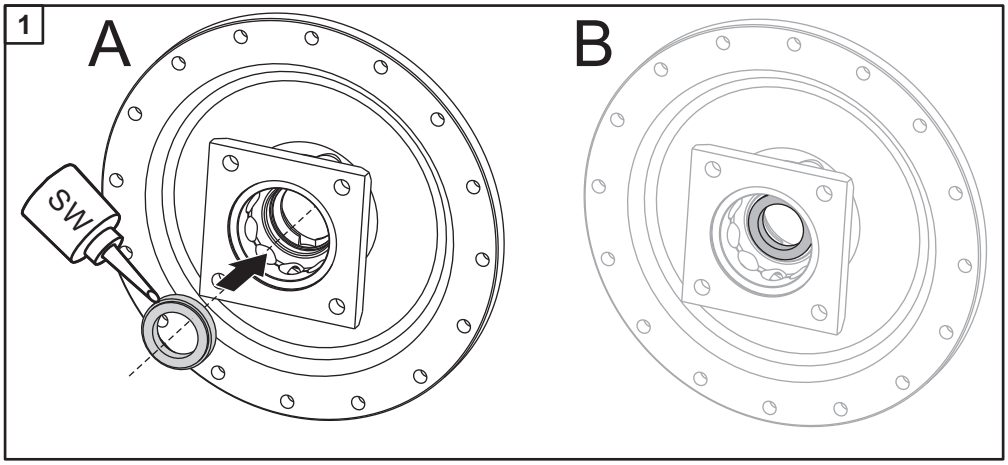


6.2.5.4 Mounting the Flange

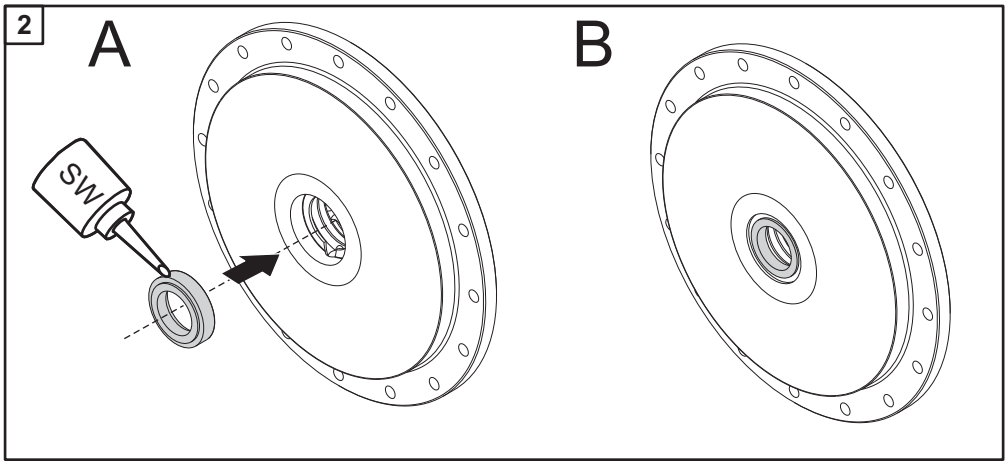
Tools required:
Allen key, 2,5 mm, 5mm Block wrench, 16 mm

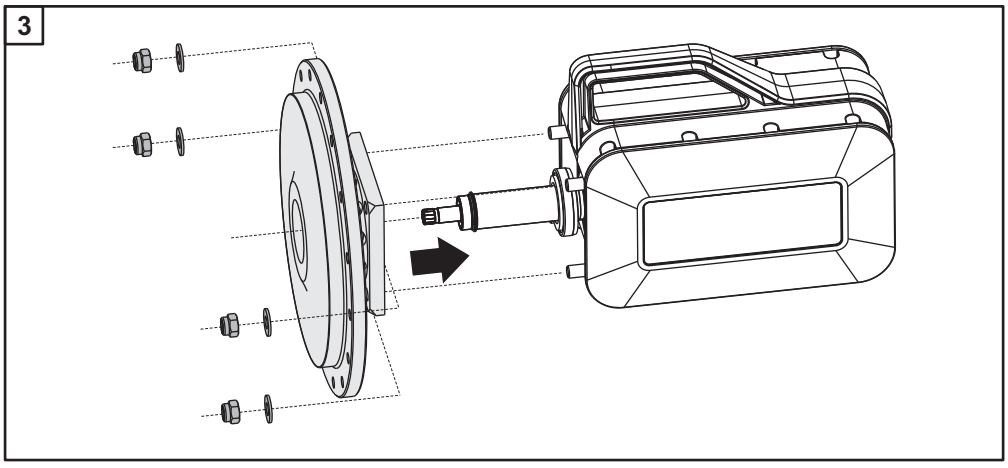
Consumables required:
Soap water (SW), Light machine oil

NOTE!
In step 1, make sure that the rubber follows the mechanical sealing and is not twisted.

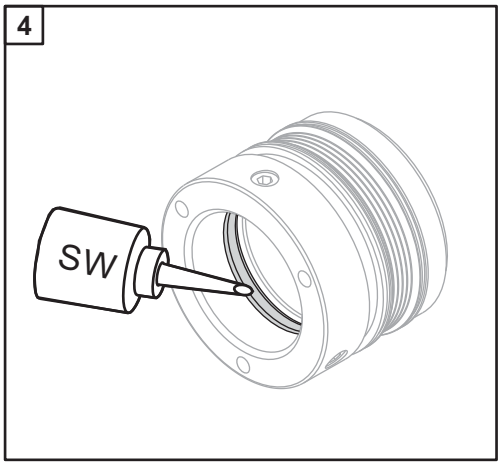


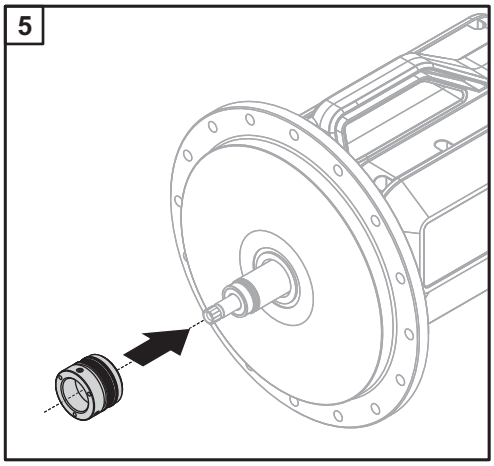
NOTE!
In step 2, make sure that the rubber follows the secondary sealing and is not twisted.

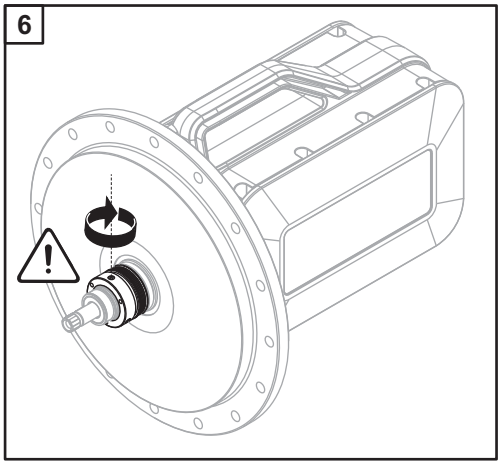


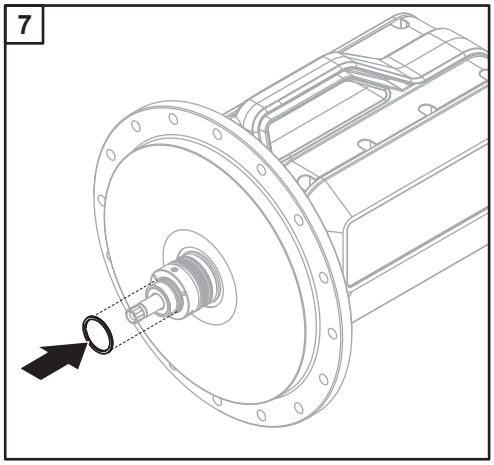


NOTE!
In step 5, press the mechanical seal past the groove in the shaft for the spiral retaining ring.

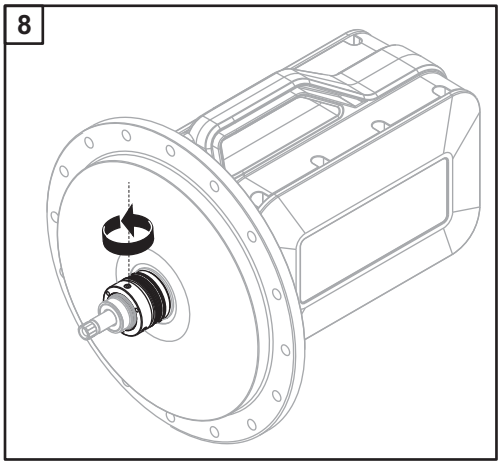


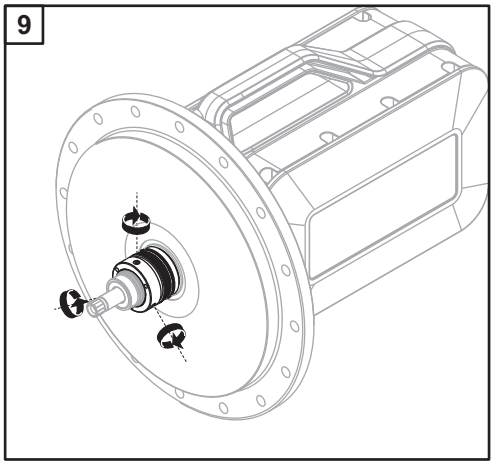






NOTE!
In step 8, make sure that the mechanical sealing slips back against the spiral retaining ring.

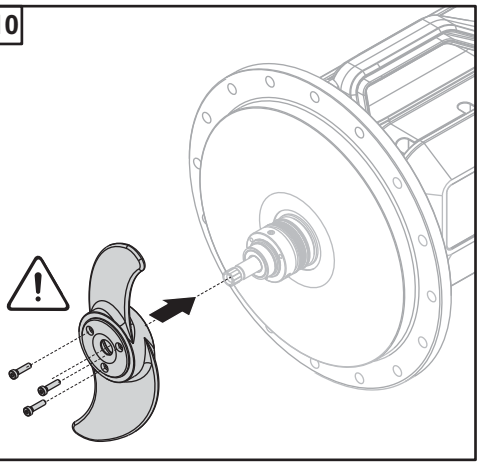




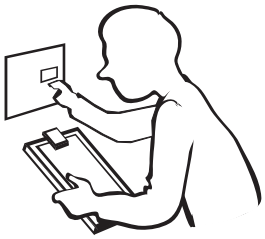
NOTE!
In step 10, tighten each screw one turn at a time until all screws are fully tightened.

NOTE!
In step 11, see section 6.2.5.5 on page 79 or section 6.2.5.6 on page 82

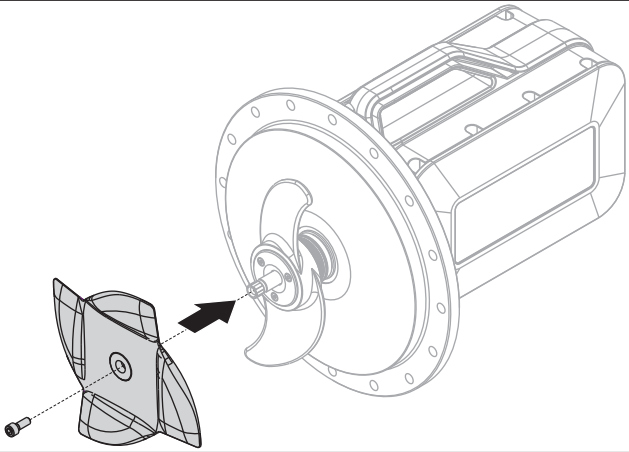
10



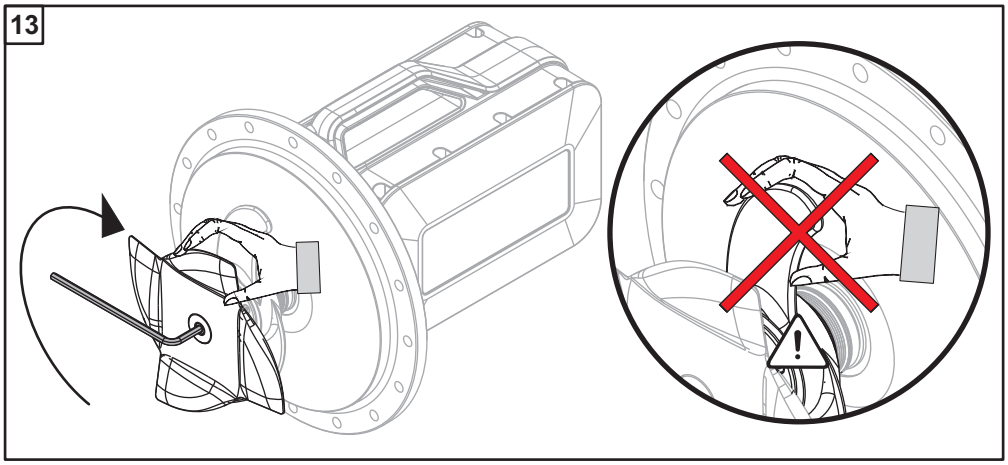
11



12



13



WARNING
Equipment damage

WARNING!
Hold the sensing element only, **not the hub or propeller**, while tightening the screw.

6.2.5.5 Adjusting the Angle Setpoint (Serial number < 44800000)

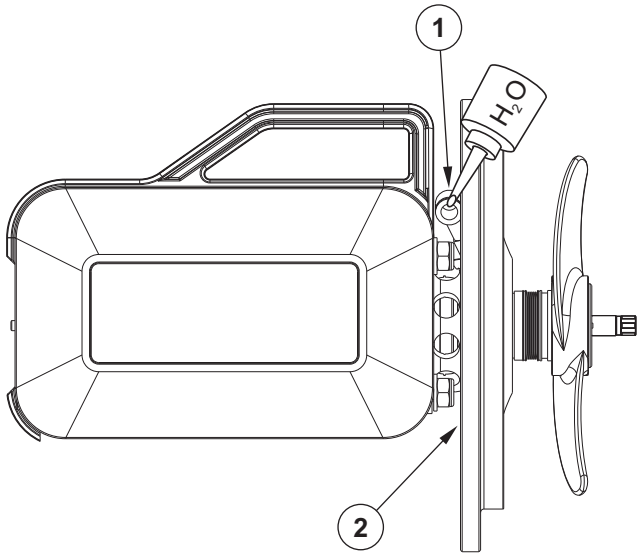
An angle setpoint adjustments must be carried out before the transmitter can be re-installed and put back into operation. See the CPM Operation Guide, included with this manual, for additional instructions on how to access the parameters mentioned below.

This procedure is only performed if the serial number is < 44800000. If any uncertainties, please contact BTG Service.

Preparations

Fig 30 Preparations

1. Outlet water coupling
2. Flushing water inlet



1. Put a plug (¼ thread) in the Flushing water inlet (2)
2. Fill the Flushing water chamber with water through the outlet water coupling (1), using a water bottle with a spout.

NOTE!
Make sure that no air is left in the Flushing water chamber. It can damage the sealings.

3. Connect the CPM and start the transmitter. See section 4.5.2: *Electrical Connections*.
4. Let the transmitter run for approximately 10 minutes.

NOTE!
The transmitter should not be run unattended. Add water in the Flushing water chamber if the water level sinks.

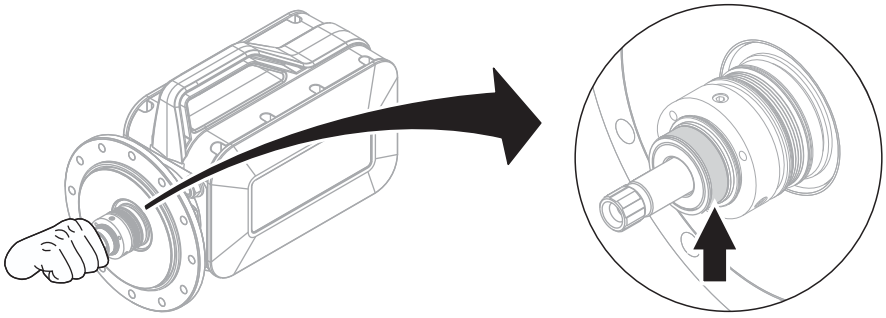
Read and compare Feedb values

1. Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb (Feed Back) value.
2. Compare this Feedb value with the Feedb value noted in section 6.2.5.1 on page 72.
3. If the two Feedb values differs less than 3 units, the angle setpoint adjustement is completed. Continue with the procedures to complete the section 6.2.5.4: *Mounting the Flange*.
4. If the two Feedb values differs more than 3 units, continue with *Adjust Feedb value* below.

Adjust Feedb value

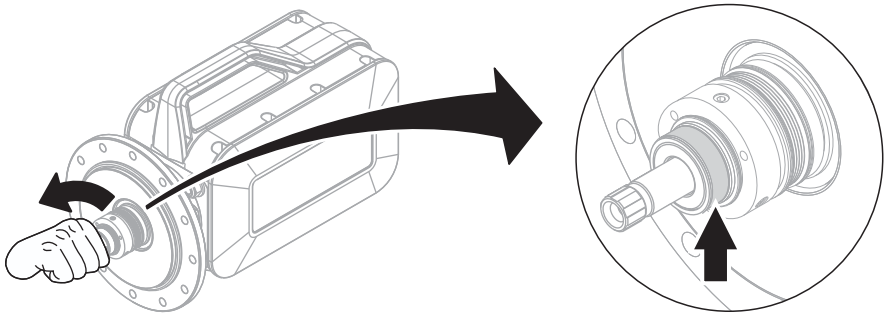
1. Stop the transmitter.
2. Remove the propeller/hub.
3. To decrease the Feedb value, turn the fastening sleeve counter clockwise by hand.

Fig 31 Turn counter clockwise



4. To increase the Feedb value, start the transmitter and brake the fastening sleeve by hand.

Fig 32 Brake by hand



5. Start the transmitter, when necessary.
6. Read and compare new Feedb value. Follow the instructions below.

Read and compare new Feedb value

1. Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb (Feed Back) value.
2. Compare this Feedb value with the Feedb value noted in section section 6.2.5.1 on page 72.
3. If the two Feedb values differs less than 3 units, *Complete after adjustments*. Follow the instructions below.
4. If the two Feedb values differs more than 3 units, *Adjust Feedb value*. Follow the instructions above.

Complete after adjustments

1. Stop the transmitter.
2. Mount the propeller/hub.
3. Start the transmitter.Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb (Feed Back) value.
4. Compare this Feedb value with the Feedb value noted in section 6.2.5.1 on page 72.
5. If the two Feedb values differs less than 3 units, the angle setpoint adjustement is completed. Continue with the procedures to complete the section 6.2.5.4: *Mounting the Flange*.
6. If the two Feedb values differs more than 3 units, remove the propeller/hub and continue with *Adjust Feedb value* above.

NOTE!
If the sensing element and propeller/hub have been changed, the sensing element type, sensing element number, and propeller number must be updated in the sensor configure menu of the CPM.

6.2.5.6 Adjusting the Angle Setpoint (Serial number > 44800000)

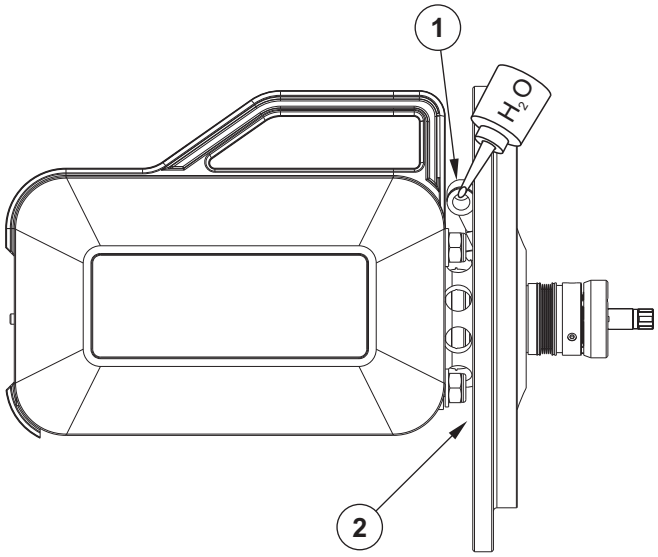
An angle setpoint adjustments must be carried out before the transmitter can be re-installed and put back into operation. See the CPM Operation Guide, included with this manual, for additional instructions on how to access the parameters mentioned below.

This procedure is only performed if the serial number is > 44800000. If any uncertainties, please contact BTG Service.

Preparations

Fig 33 Preparations

1. Outlet water coupling
2. Flushing water inlet



1. Put a plug (¼ thread) in the Flushing water inlet (2)
2. Fill the Flushing water chamber with water through the outlet water coupling (1), using a water bottle with a spout.

NOTE!
Make sure that no air is left in the Flushing water chamber. It can damage the sealings.

3. Connect the CPM and start the transmitter. See section 4.5.2: *Electrical Connections*.
4. Let the transmitter run for approximately 10 minutes.

NOTE!
The transmitter should not be run unattended. Add water in the Flushing water chamber if the water level sinks.

5. Press “F3” twice on the CPM to get to the “Raw values” menu. Read and note the Feedb (Feed Back) value.
6. Turn off the transmitter.
7. Mount the O-ring using the O-ring guide.

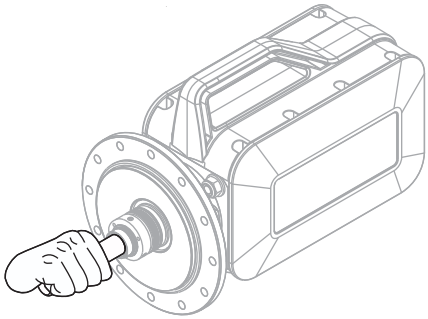
Read and compare Feedb values

1. Start the transmitter.
2. Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb value.
3. Compare this Feedb value with the Feedb value noted in *Preparations*.
4. If the two Feedb values differs less than 3 units:
   a. Stop the transmitter.
   b. Mount the propeller/hub.
   c. Read and compare new Feedb value. Follow the instructions below.
5. If the two Feedb values differs more than 3 units, *Adjust Feedb value*. Follow the instructions below.

Adjust Feedb value

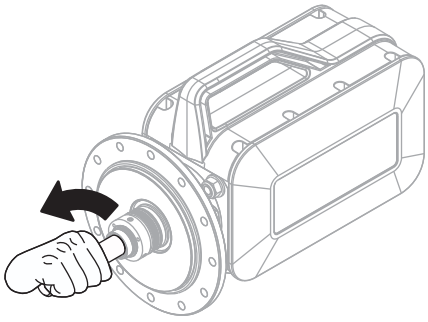
1. To increase the Feedb value, brake the O-ring using the O-ring guide.

Fig 34 Brake with O-ring guide



2. To decrease the Feedb value, stop the transmitter and turn the O-ring counter clockwise using the O-ring guide.

Fig 35 Turn counter clockwise with O-ring guide



3. *Read and compare Feedb values*. Follow the instructions above.

Read and compare new Feedb value

1. Start the transmitter, when necessary.
2. Press “F3” twice on the CPM to get to the “Raw values” menu. Read the Feedb value.
3. Compare this Feedb value with the Feedb value noted in section *Preparations*.
4. If the two Feedb values differs less than 3 units, the angle setpoint adjustment is completed. Continue with the procedures to complete the section 6.2.5.4: *Mounting the Flange*.
5. If the two Feedb values differs more than 3 units, remove the propeller/hub and *Adjust Feedb value*. Follow the instructions above.

NOTE!
If the sensing element and propeller/hub have been changed, the sensing element type, sensing element number, and propeller number must be updated in the sensor configure menu of the CPM.

6.2.5.7 Reinstalling the Transmitter

For mounting instructions and connection instructions, see chapter 4: *Installation Instructions*.

6.3 Trouble Shooting

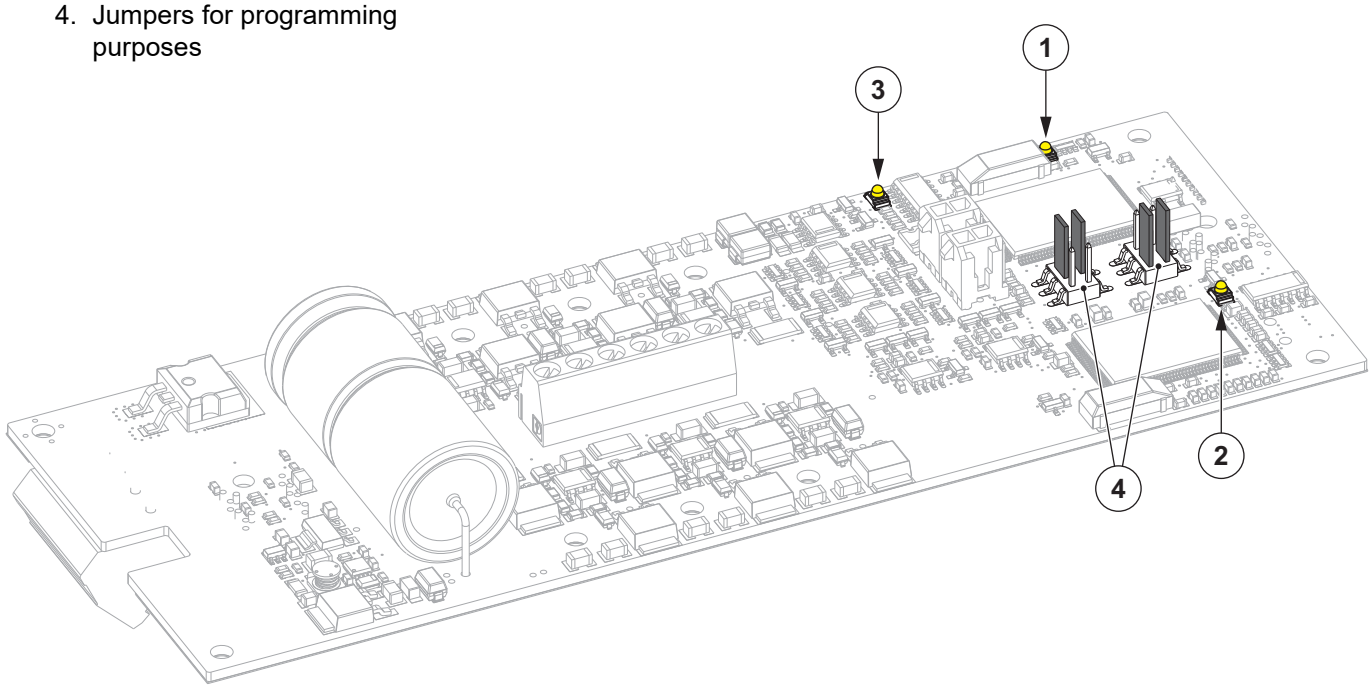
Symptom	Probable Cause	Solution
1. No or erroneous signal	1.1. Basic check	Make sure that the process is working as usual and pulp is flowing in the pipe.
		Make sure that power is supplied to the communication platform.
	1.2. Electrical error	Remove the upper cover of the transmitter to expose the sensor card. Check that LED1 on the sensor card is flashing regularly (see figure 36). Irregular flashing from LED1 indicates probable software error. Contact BTG Service for further assistance. If LED1 is off, check the wiring between the sensor card and the communication platform. If that does not help, change the sensor card If the problem still remains contact BTG Service for further assistance.
	1.3. Communication error	Remove the upper cover of the transmitter to expose the sensor card. Check that LED3 on the sensor card is flashing (see figure 36), which indicates that the communication is working. If LED3 is permanently lit, check that the system cable is correctly connected to the sensor card according to section 4.5.2.1 on page 51. If LED3 is off, check the wiring between the sensor card and the communication platform for breaks. If that does not help, change the optical card. If the problem still remains contact BTG Service for further assistance.

Symptom	Probable Cause	Solution
2. Output signal varies with changes in flow	2.1. The transmitter is not mounted according to instructions. It may be installed at a point where the pulp suspension is layered, and the layering may vary with the rate of flow.	Check the installation with reference to the Installation Engineering Guide. Note the length of the turbulence damping zone after the pump and check that the length of the connection piece is suitable for the consistency.
	2.2. Torque shaft not properly located, changes position with pressure fluctuations caused by changes in flow.	The transmitter needs to be taken out of the line and tested in a pressurized, water-filled test vessel. Contact BTG Service for further assistance.
	2.3. Position of torque wheel may change somewhat when pressure changes.	Contact BTG Service for assistance.
3. The transmitter is insensitive to consistency variations	3.1. Wrong sensing element used	Change the sensing element to a larger model. If the problem still remains contact BTG Service for further assistance.
4. The output signal is unstable	4.1. The time constant is too short	Increase damping until signal stabilizes.
	4.2. Heavy vibrations in the pulp line is causing signal drift. The end position stops are abnormally worn.	Take steps as soon as possible to cure vibration in the line.
5. The output signal is unstable after change of sensor card	5.1. The setpoint value is incorrect.	Contact BTG Service for assistance.
6. Unstable signal level	6.1. The elastic seal between the drive torque shafts has been ruined.	Contact BTG Service for assistance.
	6.2. Torque shaft bearings damaged by mechanical force or corrosion.	Contact BTG Service for assistance.
7. Mechanical seal: Cracked metal bellows	7.1. Misalignment between fixed seat and rotating part.	Change the mechanical seal. See section 6.2.2 on page 69. Contact BTG Service if this symptom returns in the immediate future.
8. Mechanical seal: Deep grooves worn in the seat rings	8.1. The seal may have run dry, and particles may have been trapped between the seat surfaces as a result of careless assembly or excess internal pressure. Grooves can also be caused by long-term normal operational wear.	Change the mechanical seal. See section 6.2.2 on page 69

Symptom	Probable Cause	Solution
9. Mechanical seal: Irregular wear marks on seat rings	9.1. The seat is not aligned	Change the mechanical seal. See section 6.2.2 on page 69
10. Mechanical seal leaks	10.1. Sealing surfaces damaged due to dry running.	Change the mechanical seal.See section 6.2.2 on page 69

Fig 36 Electronics card

1. LED1 - Software run indicator
2. LED2 - DSP indicator
3. LED3 - Communication indicator
4. Jumpers for programming purposes



6.3.1 Calibration Trouble Shooting

Typical errors in *single point* calibration		
Symptom	**Probable Cause**	**Solution**
1. Calibration lacks precision	1.1. Sample 1 (Feedback in water) is not activated. The calibration line is drawn between 0% FB and the single sample.	Activate sample 1 and perform a new lab calibration. For instructions, see the CPM Operation Guide, included with this manual.
	1.2. It's hard to get good lab samples.	Make a basic calibration using pre-defined constants. Go to Basic calibration and select pulp type. Check output from transmitter and adjust by putting in a Offset. For instructions, see the CPM Operation Guide, included with this manual
2. The measurement has a poor correlation to lab samples	2.1. The process consistency deviates too much from the value of the single sample, which reduces the accuracy.	If consistency can vary, it is recommended that additional samples, that cover the entire calibration range, are added, and a new lab calibration are performed. For instructions, see the CPM Operation Guide, included with this manual

Typical errors in *multi point* calibration		
Symptom	**Probable Cause**	**Solution**
1. Calibration lacks precision due too low correlation factor (wide scatter of calibration points round calibration line)	1.1. Bad sampling equipment.	Check the sampling equipment and quality of sampling methods. This is the most common reason for lack of precision in a calibration
	1.2. A few bad samples reduces the precision of the calibration.	Identify calibration samples that deviate too much from the lab values, and deactivate them. Perform a new calibration and make sure that the correlation factor exceeds 0.7
	1.3. The setpoint value of the feedback system controller is incorrectly adjusted.	Empty the line and check the that Feedback in air value is within 10-20% (with sensor, propeller and mechanical seal mounted). If not, the setpoint value must be adjusted. Contact BTG service assistance.
2. Calibration lacks precision outside normal working range	2.1. To few samples used in the calibration, or the samples covers a to narrow consistency span.	Take additional calibration samples, and make sure they cover as much as possible of the measuring range.

7 Appendix

7.1 HCM-8000 Connections

Connection Block			Function
P1	DI3	Digital In 3	Sample Input or Interlock
	DO	Digital Out	Alarm Output
P2	DI1	Digital In 1	Calibration set Input A
	DI2	Digital In 2	Calibration set Input B
P3	AO	Analog Out	Consistency output value, 4 - 20 mA
	AI	Analog In	Not used

Calibration Set configuration

Calibration Set	Input A (Digital In 1)	Input B (Digital In 2)
1	0	0
2	1	0
3	0	1
4	1	1

7.2 FCM-8000 Connections

Connection Block			Function
P1	DO	Digital Out	Alarm Output
	DI3	Digital In 3	Sample Input or Interlock
P2	FF / PROFIBUS PA		See separate table below for data between Profibus and Transmitter

Data Between Profibus and transmitter

Profi-bus	Transmitter	Function
AI1	AO	Consistency output
AI2	AO2	Not used
AI3	AO3	Not used
AI4	AO4	Not used
AI5	AO5	Not used
AI6	AO6	Not used
AO1	AI	Not used
DI	DO	Alarm Out(1)
DO1	DI1	Calibration set Input A
DO2	DI2	Calibration set Input B
DO3	DI3	Sample Input(1)

(1) Also available on hardware. See connection table above.

7.3 Alarms and Warnings

The following alarms and warnings are available for MEK-3000, and are accessed and configured from the CPM.

Guidelines on how to access and configure the alarm and warning settings can be found in section 8.7.2: *Configure Alarm Settings* and section 8.7.3: *Configure Warning Settings*.

All alarms and warnings are by default activated.

Alarm/ Warning	Description	Cause/Action
Temp.PCB	Triggers when the temperature on the electronics card has exceeded the defined limits.	Check reason and take actions to reduce temperature.
Temp.Mot	Triggers when the temperature on the motors has exceeded the defined limits.	Check reason and take actions to reduce temperature.
Torque	Triggers when the torque from the measuring has exceeded the defined limits.	Indicates that it is getting close to saturation. Check reason and consider changing to a smaller sensing element.
AnglStDv	Triggers when the variation of the angle between the measuring shaft and drive shaft has exceeded the defined limits.	The reason is most likely too high torque on drive or measuring shaft.
NotMeasuring	Triggers when the output signal is not updated by the transmitter anymore.	This alarm usually appears in conjunction with other alarms or warnings.
Speed	Triggers if the speed of the motor is outside the defined limits.	Possible reasons for this alarm may be high torque or incorrect settings.
Cons.Limited	Triggers if the measured consistency is above the defined upper limit, which is by default set to 20%Cs, but can be user defined. The lower alarm limit is not applicable.	This alarm may indicate a bad calibration, or abnormally high consistency levels.

7.4 Raw Values

The following raw values are available for MEK-3000 on the CPM.

Guidelines on how to access the raw values can be found in section 8.4.2: *View Instrument Information*.

Parameter	Description
Temp.PCB	The electronics card temperature
Speed	The motor speed
AngErrStDv	The angle difference value, that is, the actual value of the feedback system controller
Current	The motor current for both motors
Torque	The motor torque
FeedbRCons	Feedback raw signal / Raw consistency value

7.5 Life Cycle Diagnostics

The following life cycle diagnostics are available for MEK-3000 on the CPM.

Guidelines on how to access the diagnostics can be found in section 8.7.1: *Life Cycle Diagnostics*.

Parameter	Description
CalibSetChanges	The number of times the active calibration set has been changed through the digital inputs. An unexpectedly high number may indicate loose contacts at the digital input connections.
Interlocks	The number of times interlock have been activated. An unexpectedly high number may indicate loose contacts at the digital input connections.
CalibChanges	The number of times calibration have been changed.
OffsetChanges	The number of time the offset adjustment have been changed.
MotorInControl	The number of times the measuring system have entered normal control mode. A high number may indicate problems with the mechanical seal.
Pcb xx-xx°C	The runtime of the transmitter, specified in number of weeks, within various temperature intervals. The temperature is measured on the electronics card (PCB).

7.6 Pulp Types

Pre-defined calibrations are available for the pulp types specified in the table below.

Guidelines on how to set/change pulp type can be found in section 8.5.3: *Basic Calibration*.

Pulp type	Explanation
CTMP	Chemi-ThermoMechanical pulp
GW	Ground Wood
HWB	HardWood Bleached
HWU	HardWood Unbleached
OCC	Old Corrugated Container
ONP	Old News Paper
SWB	SoftWood Bleached
SWU	SoftWood Unbleached
TMP	ThermoMechanical pulp
Test	Used for validation in BTG production

7.7 MEK-3000 Documentation Form

Instrument ID/Tag: ..... Serial No.: .....

Date:..... Signature:.....

Calibration Set	**Set 1**	**Set 2**	**Set 3**	**Set 4**
Quality/Pulp:				
Measurement/Sample Menu - View/Edit Basic Settings (See section 8.4.3 on page 109)				
Damping				
Offset				
Lower measuring range value (LRV)				
Upper measuring range value (URV)				
Calibrate Menu - Basic Calibration (See section 8.5.3 on page 115)				
C0				
C1				
C2				
Configure Menu - Sensor Configuration (See section 8.6.3 on page 124)				
Sensor type:	Sensor no:		Propel. no:	
CurrentToTorq:		CurrentOffset:		
Speed:		Mode34Speed:		
AngleSetpoint:	Motor Version:		Hardware Ver.:	

8 CPM Operation Guide

8.1 Introduction

The CPM communication platform is delivered as a complete unit from BTG, normally in conjunction with an instrument. The CPM is a control panel for complete configuration and operation of the instrument.

8.1.1 Software Versions

All instructions and display view images in this guide are based on the software versions specified in the tables below. Minor differences may occur for other versions. Valid software versions for your system can be found on the CPM main menu (see section 8.2: *Menu Structure Overview*).

Communication module	Software Version
HCM-8000	3.5
FCM-8000	3.5

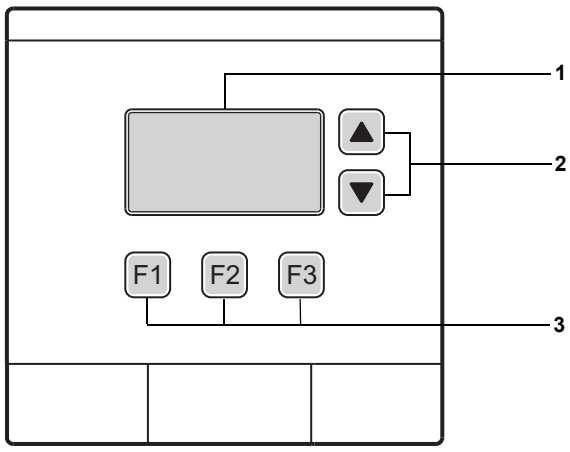
Instrument	Software Version
MEK-3000	1.7

8.1.2 User Interface

The CPM user interface consists of a display, three function keys (F1, F2 and F3), and two scroll keys (Up and Down). All are located on the front panel of the unit.

Fig 37 CPM Front panel

1. Display
2. Scroll keys
3. Function keys



The function keys have different functions depending on where you are in the menu structure. The actual function of each key is shown on the bottom row of the display, directly above the corresponding key.

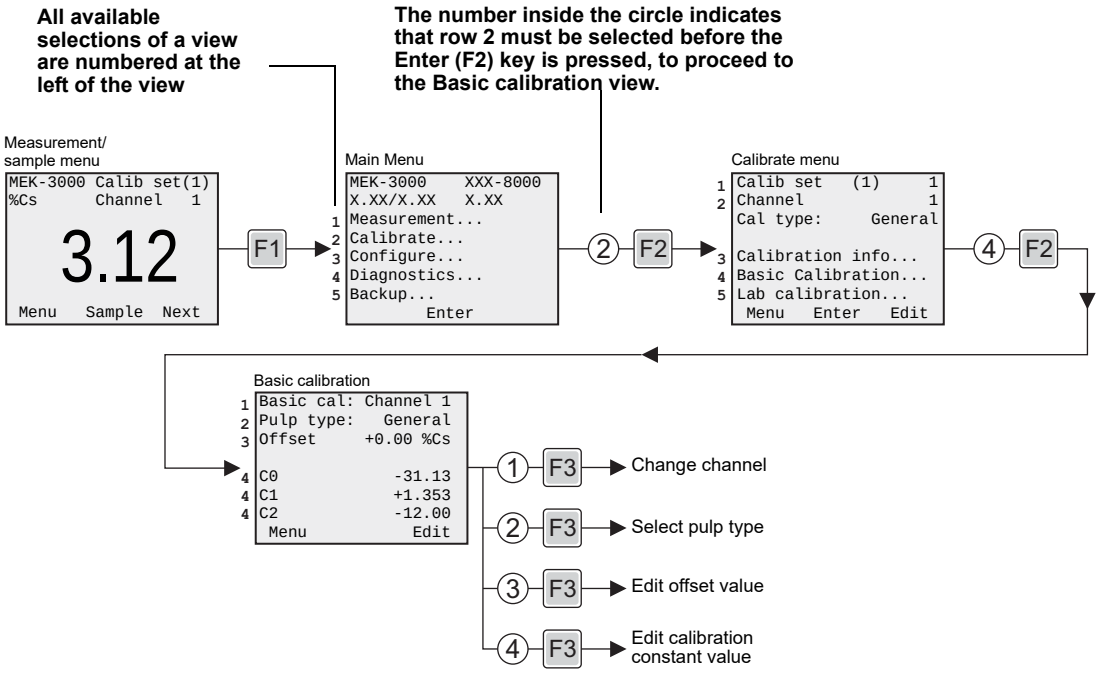
The scroll keys are used to step between different available selections, and to change parameter values.

8.1.3 How to Read This Guide

This guide is a reference manual for all operation actions that can be performed using the CPM Communication Platform. The operations described in this guide are general for all CPM based instruments.

The guidelines in this guide are based on flow charts that show how to navigate through the different display views to perform the desired tasks. The instructions always start from the *Measurement/sample menu* (see section 8.2: *Menu Structure Overview*), and the views are shown in logical order. For views with multiple available selections, each selection is numbered in the flow charts, at the left of the view. Between the display views, the number of the required selection (if any), and the key that must be pressed, are shown. See the example in figure 38.

Fig 38 Instruction example



8.1.4 Parameter Input

Many tasks involve changing parameter values, and this can be done in two ways depending on the parameter type.

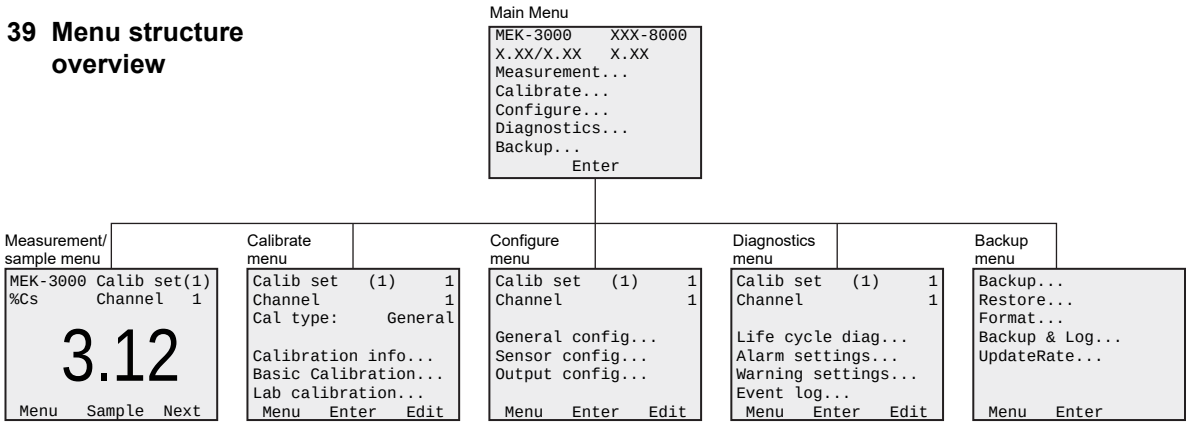
Normally when you select a parameter and press the **Edit (F3)** key, a blinking cursor appears on the first digit or letter of the parameter value. Use the scroll keys to assign a value to the marked digit/letter and press the **F2** key to step to the next digit/letter. When finished, press the **OK (F3)** key to confirm the change. If a non-allowed value is selected, the parameter will retain its old value.

For some parameters however, pressing the **Edit (F3)** key will bring up a list of available options for the parameter. Use the scroll keys to select desired option and press the **OK (F3)** key to go back to the previous view.

8.2 Menu Structure Overview

The menu structure of the CPM is based on a main menu with five sub-menus. All instrument operations are performed from any of the sub-menus.

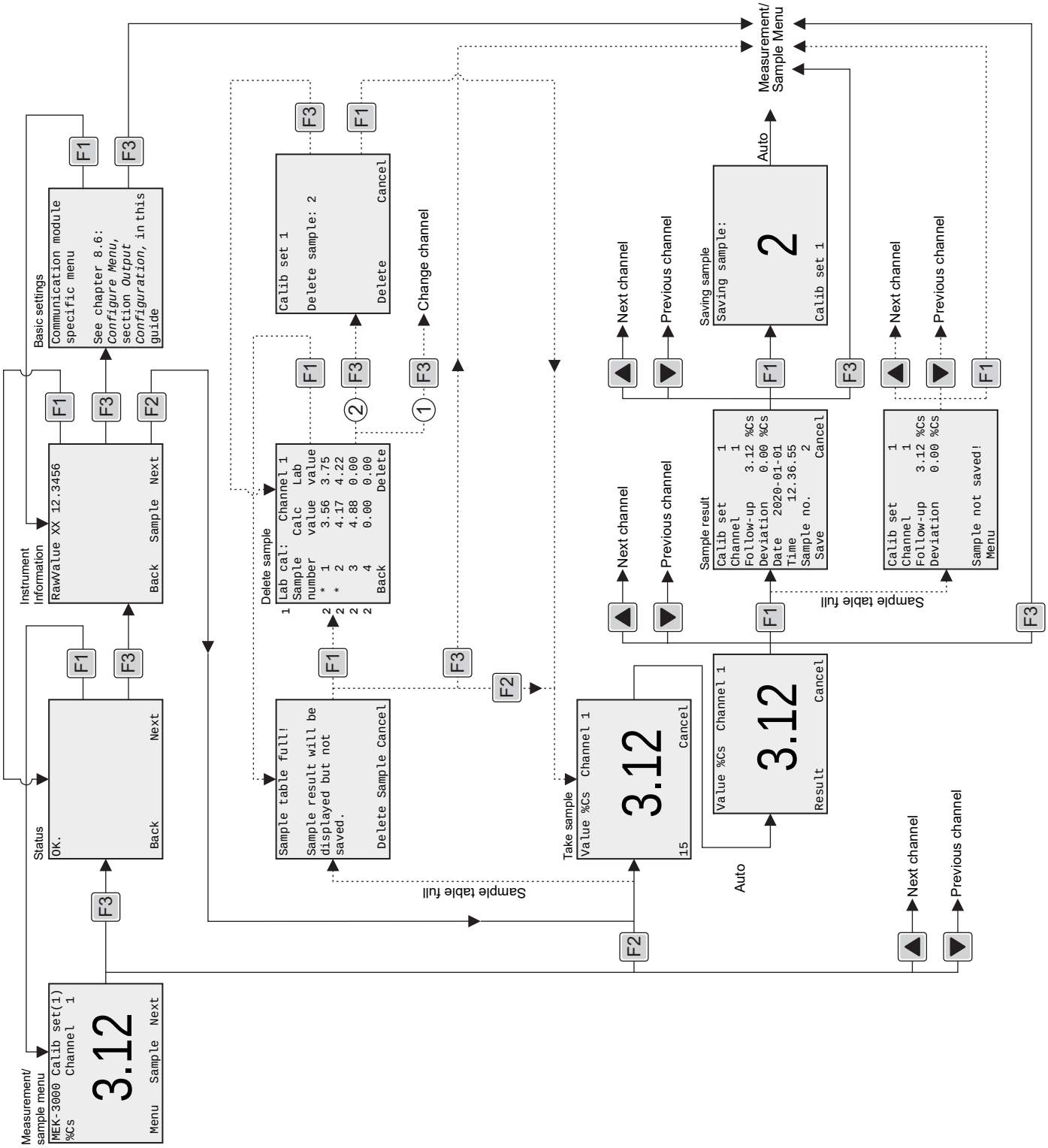
Fig 39 Menu structure overview



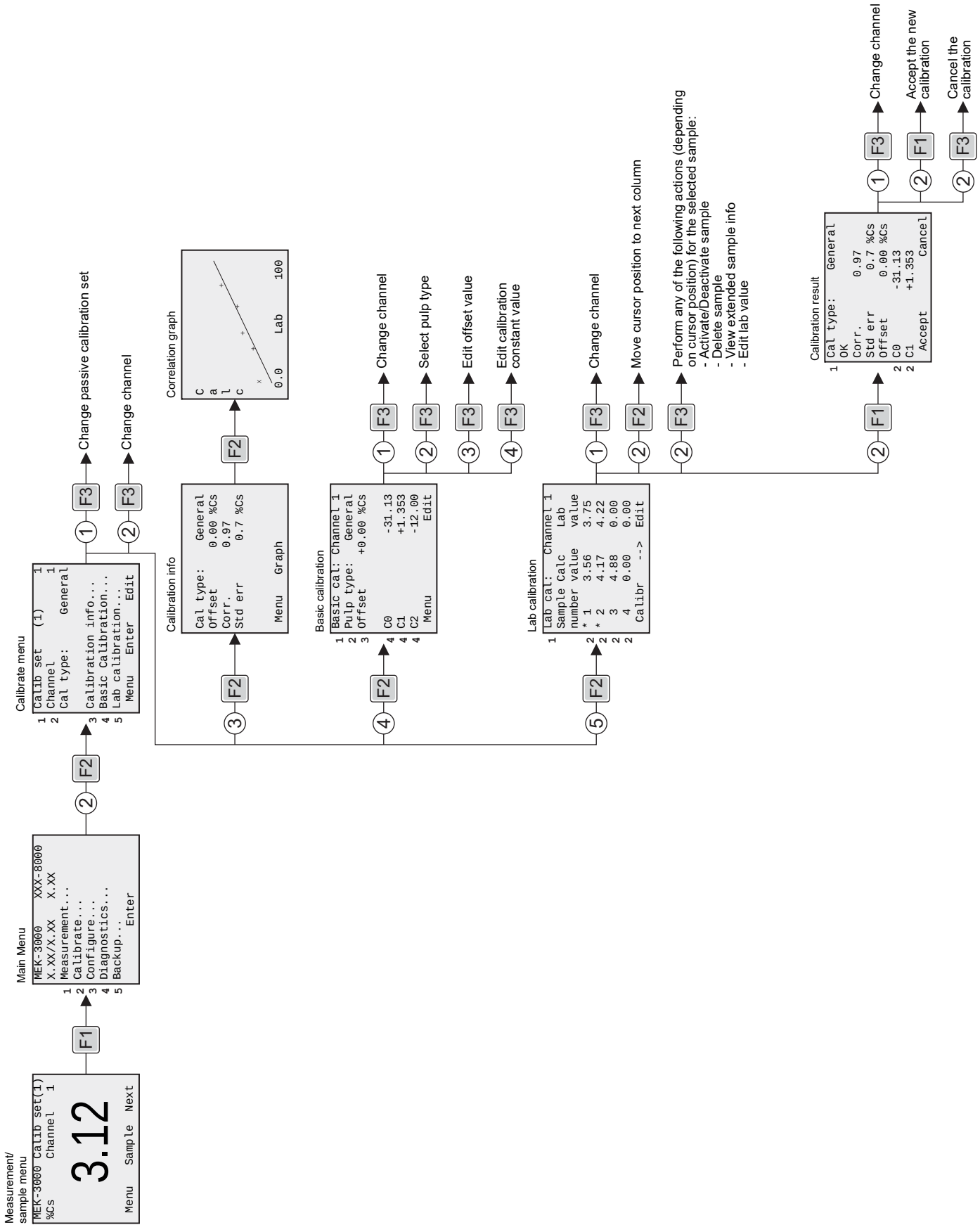
- The ***Measurement/sample menu*** is used for viewing measurement results, and for taking calibration samples. This is the default menu on the display at start-up, and reappears after five minutes of inactivity.
- The ***Calibrate menu*** is used to calibrate the instrument.
- The ***Configure menu*** is used for configuration of the instrument settings.
- The ***Diagnostics menu*** is used for viewing various instrument diagnostics, and for configuration of alarm/warning settings.
- The ***Backup menu*** is used to backup instrument data to a memory card, or restore previously backed up data.

Each sub-menu is described in a separate section of this manual.

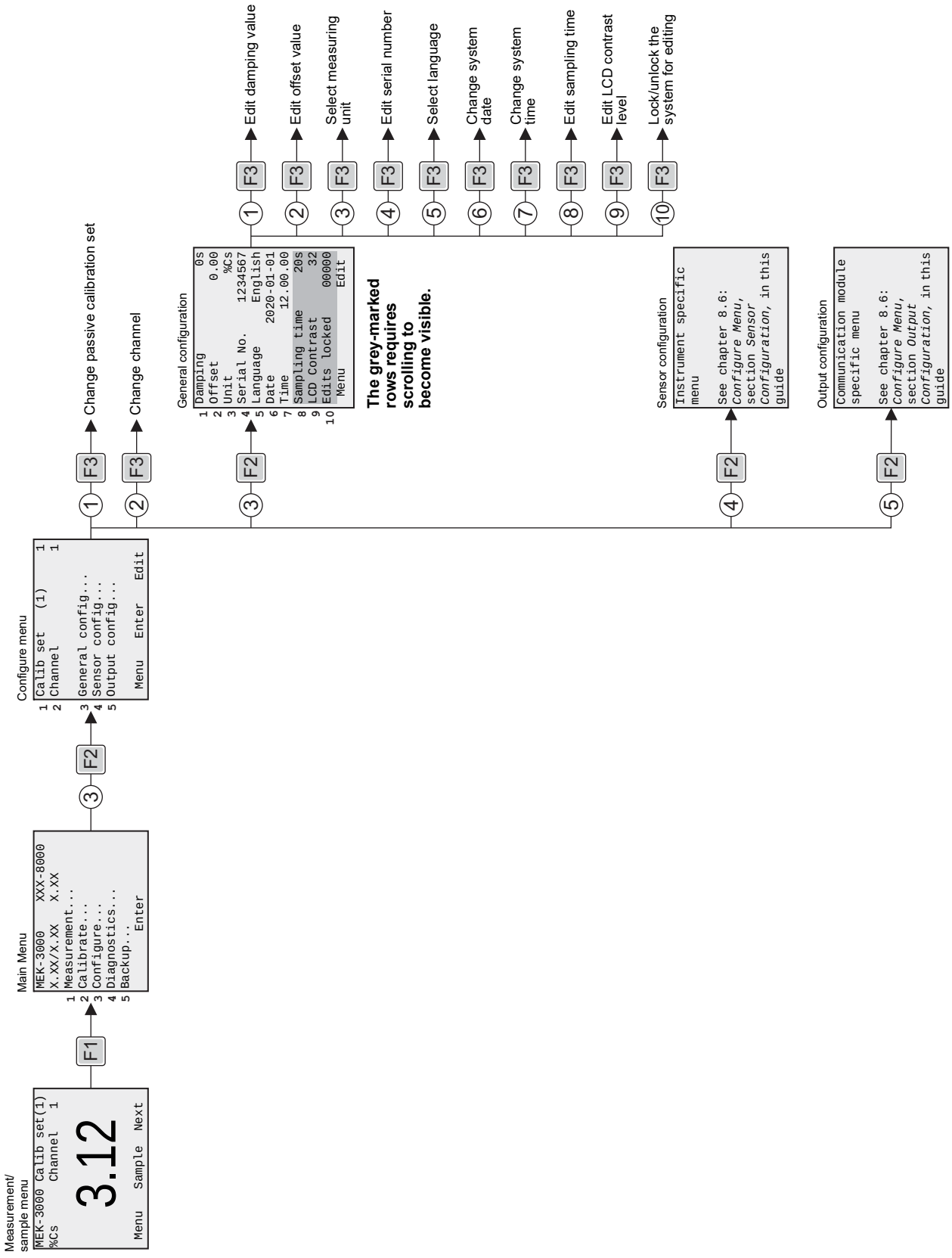
8.2.1 Measurement/Sample Menu



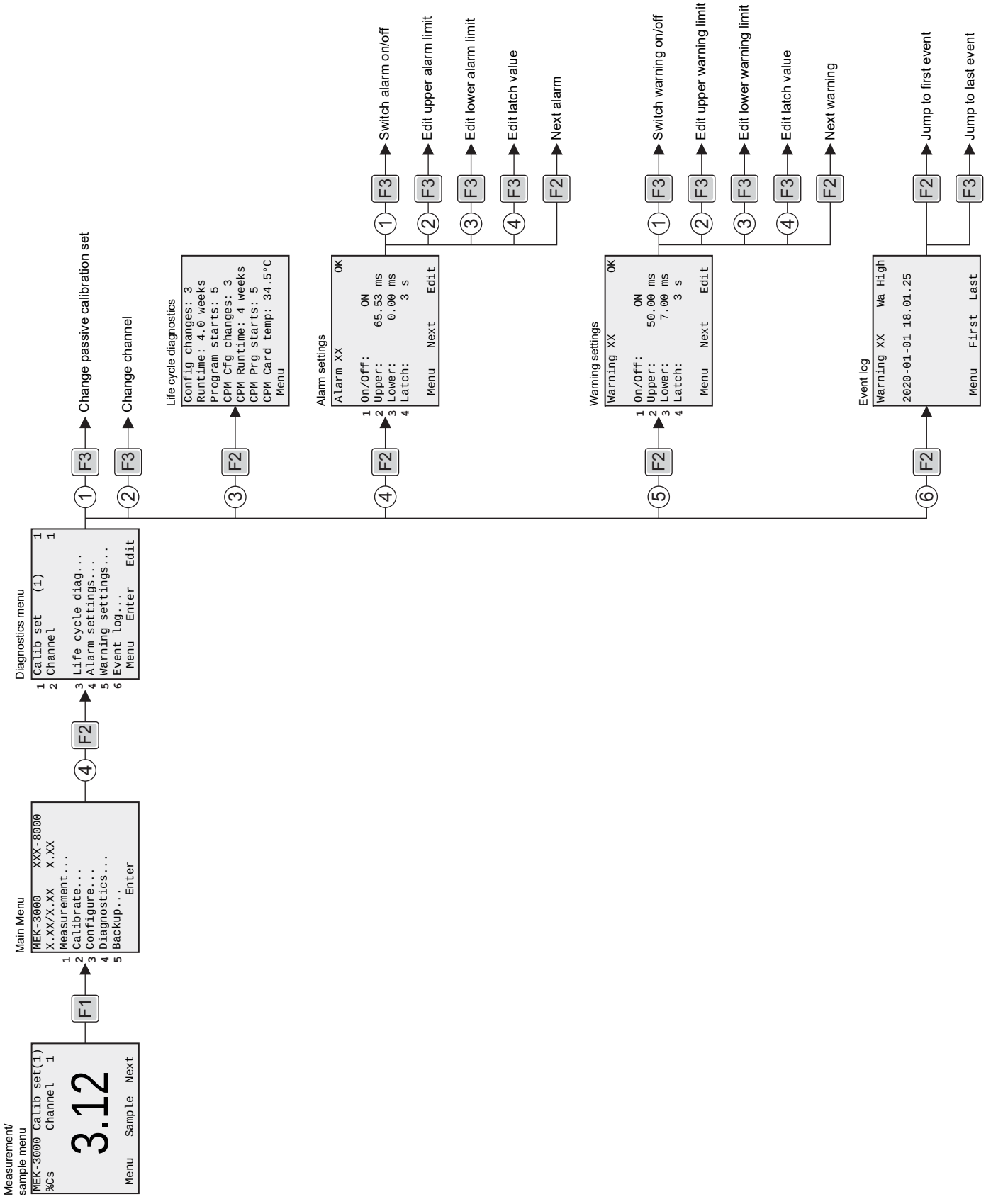
8.2.2 Calibrate Menu



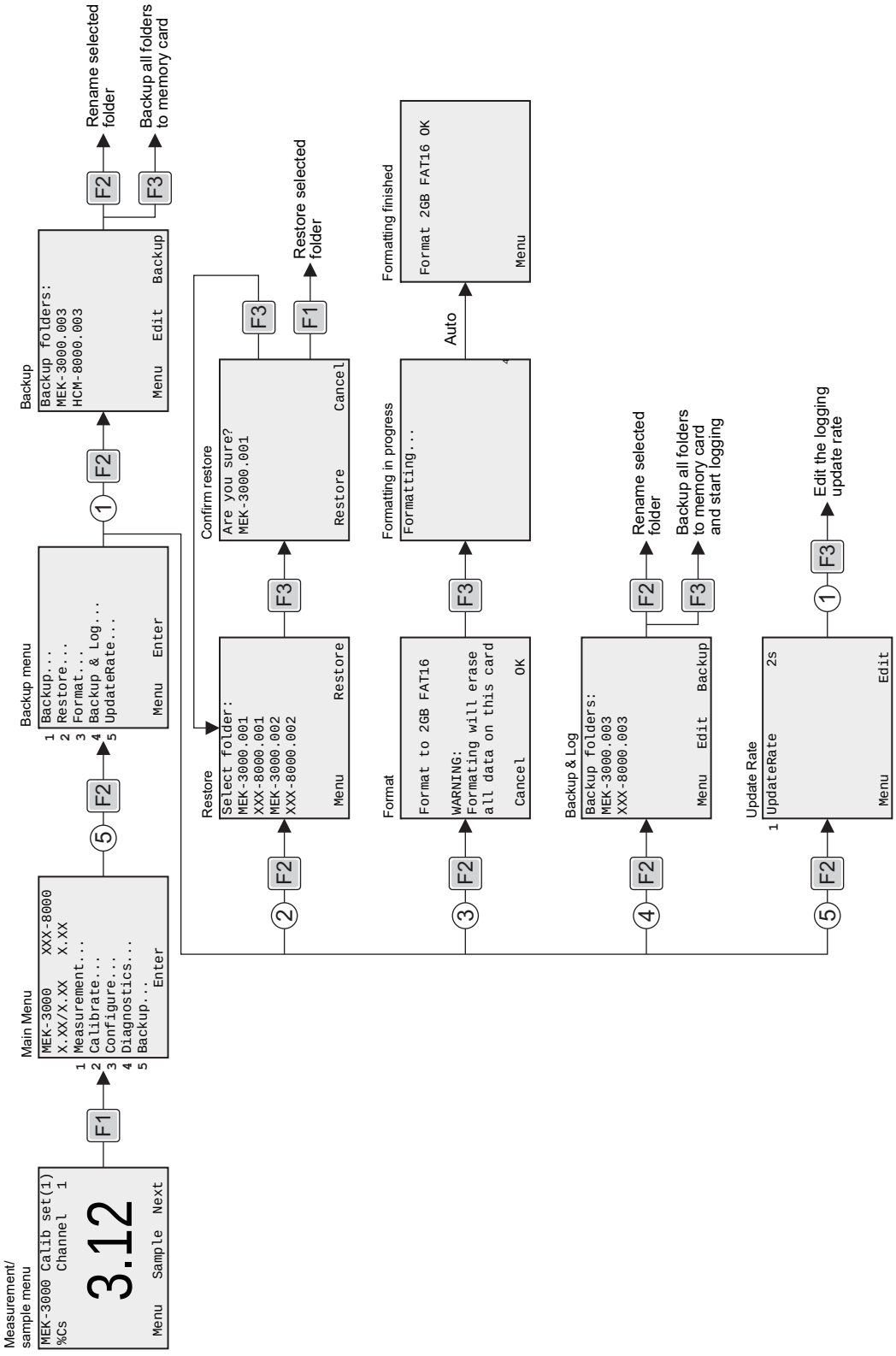
8.2.3 Configure Menu



8.2.4 Diagnostics Menu



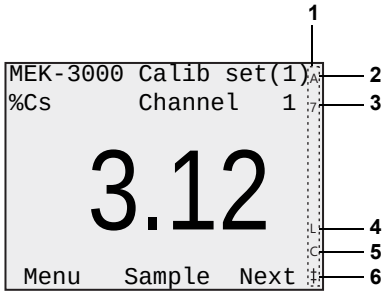
8.2.5 Backup Menu



8.3 General Operation

8.3.1 Indicators

A thin column at the rightmost section of the display is reserved for indicators of various kind. The indicators that can appear in this area are shown and explained below.



1. Indicator column
2. Alarm indicator
3. Communication indicator
4. Lock indicator
5. Logging indicator / Formatting Countdown timer
6. Scrolling indicator

Indicator	Description
Alarm indicator	The alarm indicator appears as a blinking ‘A’ at upper right corner of the display and indicates that an alarm has been triggered and is currently active. Enter the Status View to see more information about an active alarm (see section 8.4.1: *View Device Status*).
Communication indicator	The communication indicator appears as a number (0-9) in the second row of the indicator column and indicates communication problems between the CPM and the instrument. The number shows the amount of succeeded request as follows: 0: 0 - 5% 5: 45 - 55% 1: 5 - 15% 6: 55 - 65% 2: 15 - 25% 7: 65 - 75% 3: 25 - 35% 8: 75 - 85% 4: 35 - 45% 9: 85 - 95% No indicator is shown if the communication is close to faultless (95 - 100% succeeded requests).

Indicator	Description
Lock indicator	The lock indicator appears when the system is locked for editing, which means that no settings can be changed. For more information on how to lock/unlock the system, see section 8.6.1: *General Configuration*.
Logging indicator / Formatting Countdown timer	The logging indicator appears as a blinking letter 'C' and indicates that logging to the SD card is in progress. While the logging indicator is visible, the sub-menus of the *Backup menu* are unavailable, and trying to accessing the *Backup menu* will lead to the logging view. See section 8.8.4: *Store Data and Log Tables on Memory Card* for more information. The formatting countdown timer appears during formatting of the SD card and shows the remaining number of seconds until the format process is finished. See section 8.8.3: *Format Memory Card* for more information.
Scrolling indicator	The scrolling indicator appears as a two way arrow at the lower right corner of the display, and can indicate two things: • The currently displayed view contains non-visible rows that can be reached by scrolling up or down using the scroll keys. • The currently displayed view can show information for other channels than the currently selected. Information for other channels are accessed by pressing the scroll keys.

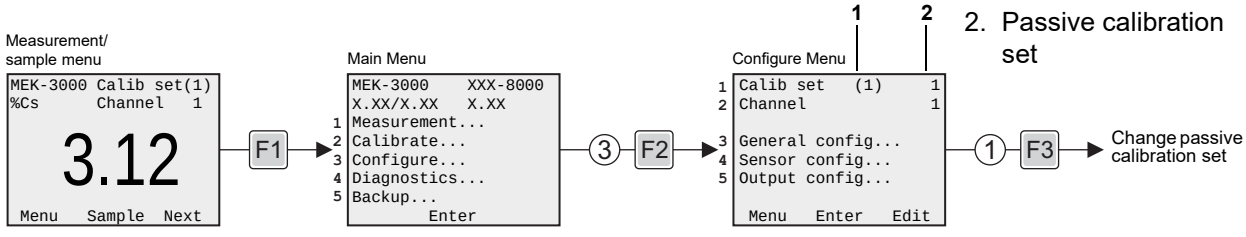
8.3.2 Calibration Set

Some instruments can handle multiple (usually four) separate calibration sets. Using separate calibration sets enables separate calibrations to be made for different qualities and conditions in the process.

Calibration set selection is hardware controlled via binary inputs to the CPM. However, the instrument settings for any calibration set can be configured at any time, regardless of which calibration set is active.

The active calibration set is indicated by a number within parentheses, and can be viewed in the *Measurement/Sample* menu, the *Calibrate menu*, the *Configure menu*, and the *Diagnostics menu*. The calibration set that configuration changes will apply to is defined as the passive calibration set, and can be specified from the *Calibrate menu*, the *Configure menu*, and the *Diagnostics menu*.

1. Active calibration set
2. Passive calibration set



8.3.3 Channels

Some instruments can provide multiple types of measurement results, and this is handled by using separate channels.

Each channel has its own configuration and is calibrated separately, but calibration samples are always taken for all channels at once. Measuring results, calibration data, and instrument settings are always displayed for the active channel only.

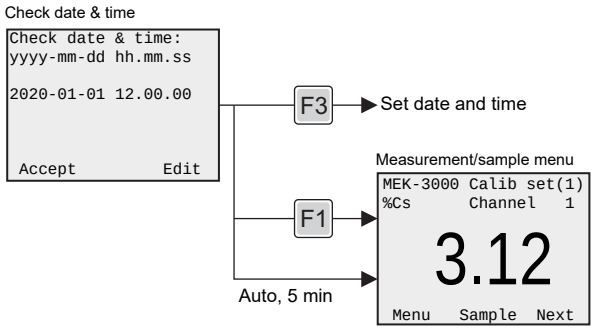
The active channel can be viewed and changed from various display views in the menu structure. See the menu structure overview diagrams in section 8.2: *Menu Structure Overview* for more information.

More information about the available channel(s) for the instrument can be found in the appendix section of this manual.

8.3.4 Check Date and Time

A date and time check is made each time the CPM is started, and you can accept or edit the present date and time settings. When the time and date settings have been accepted, or after five minutes of inactivity, the display will proceed to the *Measurement/sample menu*.

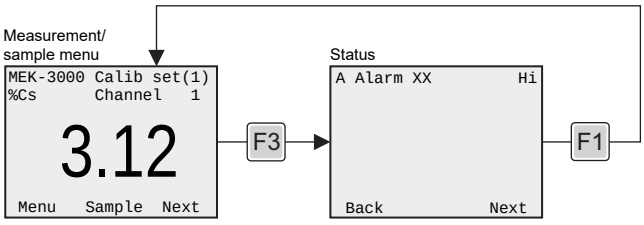
For older HCM-versions, without a real time clock, the clock will stop when power is turned off and resume running when power is turned back on. A real time clock will continue to run 1-2 weeks with power turned off. Time and date can also be configured later from the *Configure menu*. See section 8.6.1: *General Configuration*.



8.4 Measurement/Sample Menu

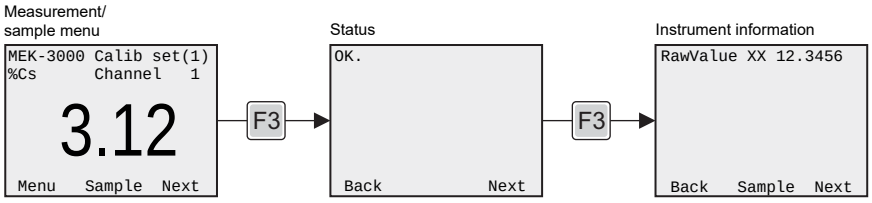
8.4.1 View Device Status

The status view shows any active alarms, warnings, or system status messages. An active alarm is indicated in the *Measurement/Sample menu* by the letter “A” blinking in the upper right corner of the display. Warnings and system status messages have no indicators.



8.4.2 View Instrument Information

The Instrument information view shows useful live data from the instrument. It is also possible to take samples from the Instrument information view. See section 8.4.4: *Take Sample* for more information about sampling.



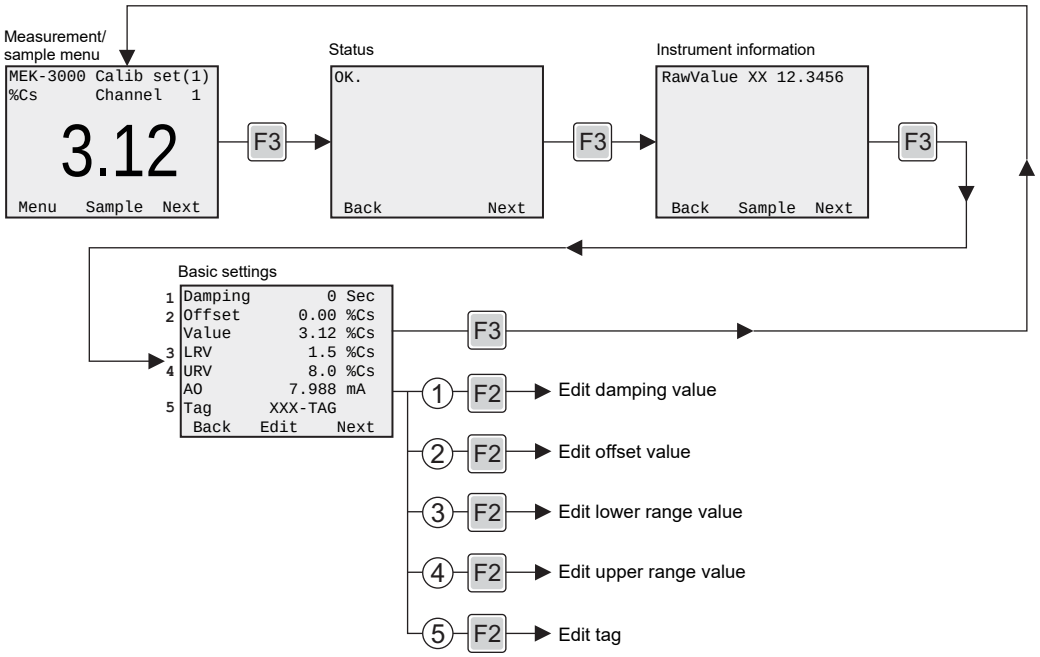
Detailed descriptions of the instrument information shown for the current instrument can be found in the appendix section of this manual.

8.4.3 View/Edit Basic Settings

The most basic instrument settings are available from the Basic settings view, which is quickly and easily accessed from the *Measurement/sample menu*. All basic settings can also be accessed from the *Configure menu*. See section 8.6: *Configure Menu*.

8.4.3.1 Basic Settings for HCM-8000

All displayed values and all changes made in the Basic settings view are valid for the active calibration set.



The parameters in the Basic settings view are as follows:

Parameter	Description
Damping	A damping constant that can be set to stabilize the signal.
Offset	Offset adjustment of known error in the calibration.
Value	The present output value from the instrument (Read-only).
LRV	Lower measuring range value, represented by an output signal of 4 mA.
URV	Upper measuring range value, represented by an output signal of 20 mA.
AO	The present analog output value from the instrument (Read-only).
Tag	The instrument identification name. Maximum eight characters.

8.4.3.2 Basic settings for FCM-8000

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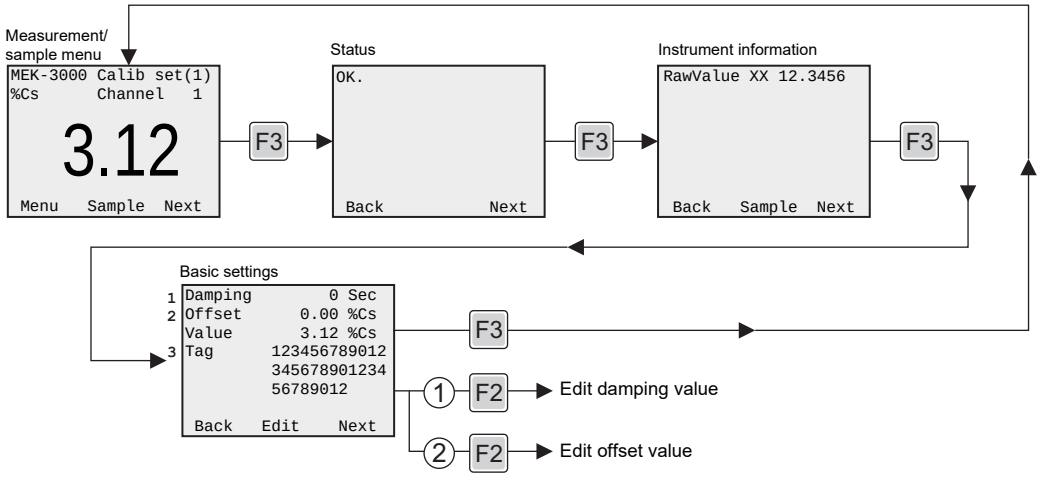


The parameters in the Basic settings view are as follows:

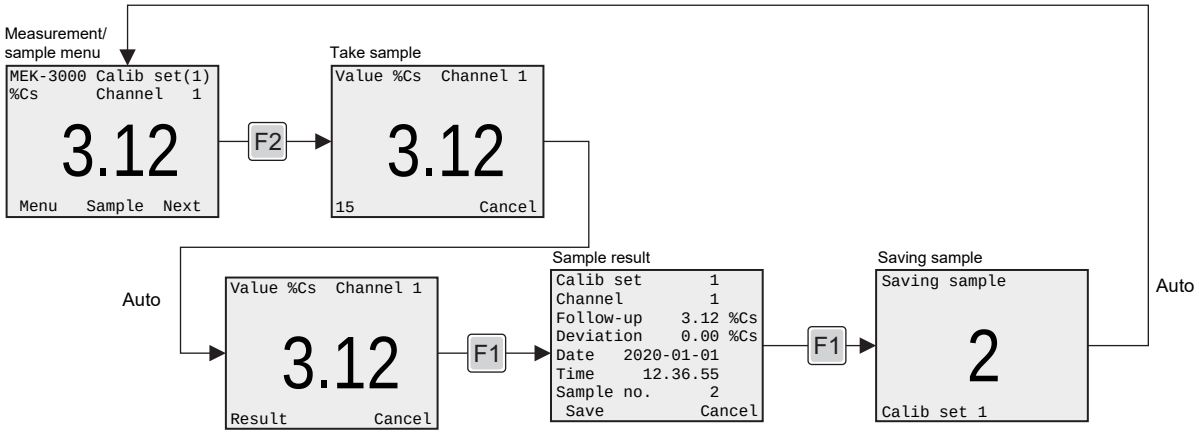
Parameter	Description
Damping	A damping constant that can be set to stabilize the signal.
Offset	Offset adjustment of known error in the calibration.
Value	The present output value from the instrument (Read-only).
Tag	The instrument identification name (32 characters, read-only)

8.4.4 Take Sample

Calibration samples are taken directly from the *Measurement/Sample menu,* or from the *Instrument information view*. Samples are saved for all channels at once, but only for the presently active calibration set.

While taking samples, collect pulp samples from the line for lab evaluation at the same time. Mark each pulp sample with sample number, sample date, and sample time.

The number of samples that can be saved in the sample table depends on the instrument type..

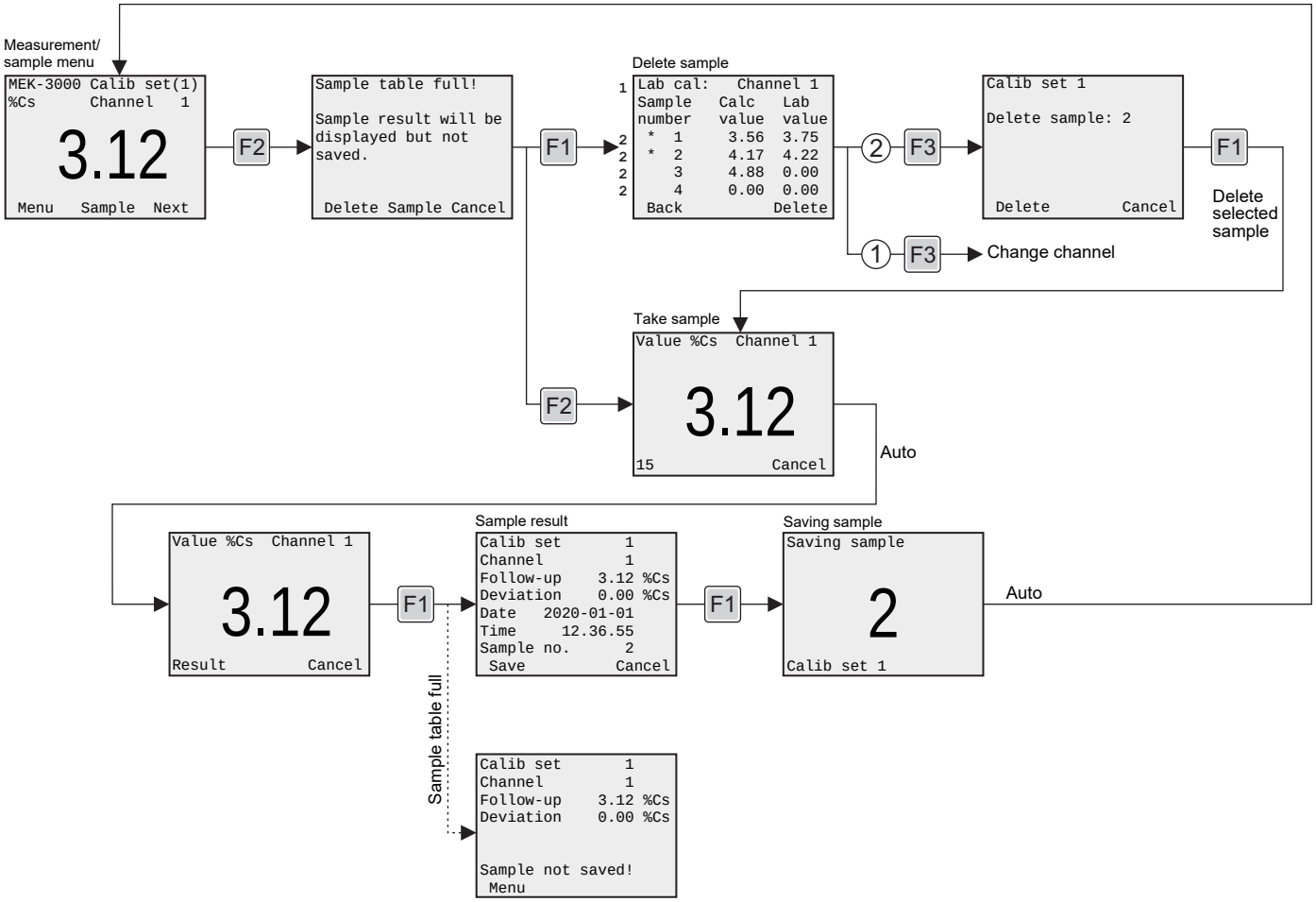


The parameters in the Sample result view are as follows

Parameter	Description
Calib set	The active calibration set, for which the sample can be saved.
Channel	The channel for which the displayed results are valid. Use the up and down buttons to see results for other channels
Follow-up	The mean measurement value during the sampling period.
Deviation	Standard deviation of the sample.
Date	The date the sample was taken.
Time	The time the sample was taken.
Sample no.	The sample’s number in the sample table.

8.4.4.1 Sample Table Full

If the sample table is full (i.e. no more samples can be saved), a warning will be displayed, and you will be given the option to delete one sample. Should you decide not to delete any sample, you can still proceed with the sampling procedure and present the sample result, but you will not be able to save the sample.

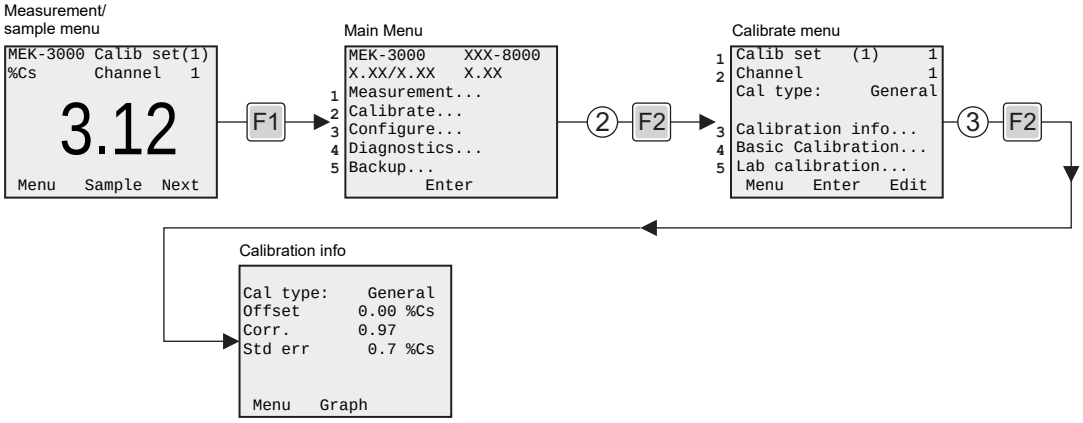


NOTE!
If parameter *DelOldestSampl* is available in from *Sensor configuration* menu for the current instrument (See chapter 8.6: *Configure Menu*, section *Sensor Configuration*), and is set to *ON*, the oldest sample will be overwritten automatically.

8.5 Calibrate Menu

8.5.1 View Calibration Information

The Calibration info view shows various information about the present calibration.



The parameters in the Calibration info view are as follows:

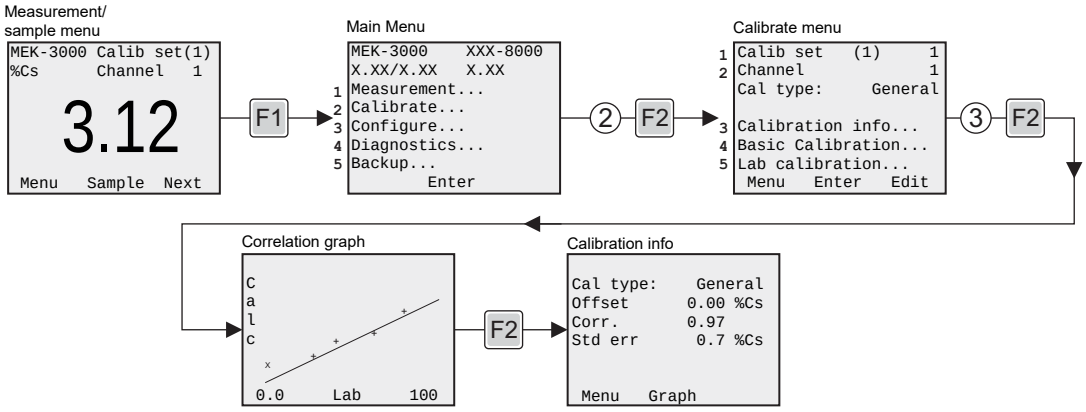
Parameter	Description	Explanation
Cal type	The present calibration type	If the present calibration is a basic calibration, the calibration type is either specified as *User*, or as a specific pulp type, depending on how the calibration is performed. See section 8.5.3: *Basic Calibration* for more information. If the present calibration is a lab calibration, the calibration type is specified with the name of the calibration method used to calculate the calibration. See section 8.5.4: *Lab Calibration* for more information
Offset	Offset adjustment of known error in the calibration (always reset to zero when a new lab calibration is performed)	
Corr.	The correlation coefficient	
Std err	The standard error	

8.5.2 View Correlation Graph

The correlation graph provides a graphical view of how well the calculated sample values correlate to their lab values.

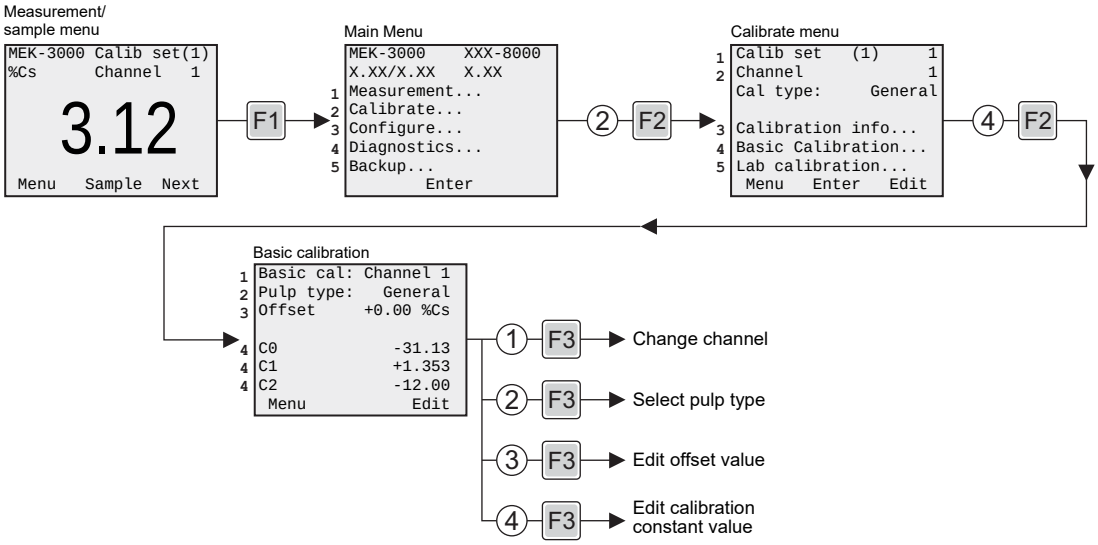
Only samples with a lab value assigned are shown in the graph. Activated samples are designated by a "+" sign, while deactivated samples are designated by an "x".

Any of the function keys (F1, F2 and F3) can be used to return to the previous screen.



8.5.3 Basic Calibration

A basic calibration is a simplified calibration method, using pre-defined calibration constants. It is performed either by selecting pre-defined calibration constants for a specific pulp type, or by manually entering the calibration constants if these are known.



The parameters in the Basic calibration view are as follows:

Parameter	Description	Explanation
Channel	The channel selected for the calibration	
Pulp type	The pulp type for which pre-defined calibration constants are used	Selected from a list of available pulp types. If calibration constants have been manually entered, or if a lab calibration has been performed, the pulp type will be dashed out. **Note:** Changing pulp type will overwrite the calibration constants in the present passive Calibration Set to the default values of a pre-defined calibration. At the same time, all active lab samples in the present passive Calibration Set will automatically be set to inactive in order to indicate that they are not a part of the present calibration
Offset	Offset adjustment of known error in the calibration	
C0, C1, C2...	Calibration constants	The number of constants varies depending on instrument type. If there are more than three constants, the view can be scrolled using the up/ down arrow buttons.

8.5.4 Lab Calibration

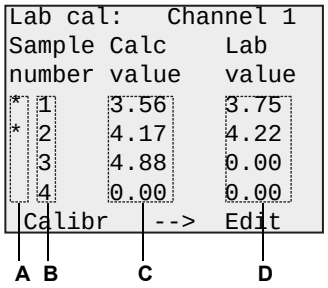
A lab calibration is based on a number of sample values and their corresponding lab values. The number of samples needed for a calibration depends on the instrument type and the process conditions. Very large variations in pulp/stock compositions can be handled by using separate calibration sets. Separate calibration sets and channels are calibrated separately.

8.5.4.1 Sample Management

The Lab calibration view shows a list of all available samples. When a sample is selected, a cursor will appear at the Sample activation column (the leftmost column). There are four columns (see figure 40) through which the cursor position can be moved by pressing the **F2** button. Each column has an associated action, which is performed for the selected sample by pressing the **F3** button. The available actions are described in the table below.

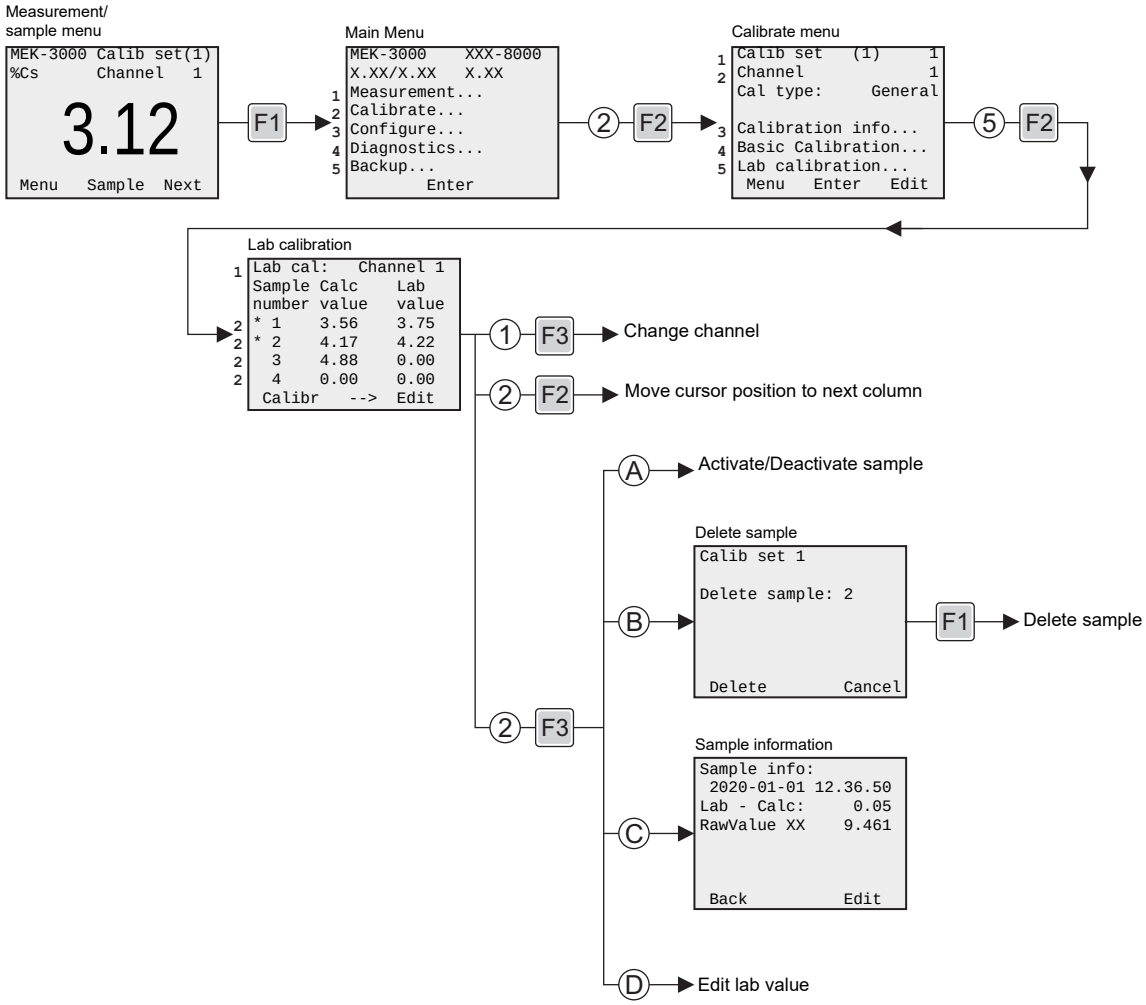
Fig 40 Lab calibration view columns

A. Sample activation column
B. Sample number column
C. Calculated value column
D. Lab value column



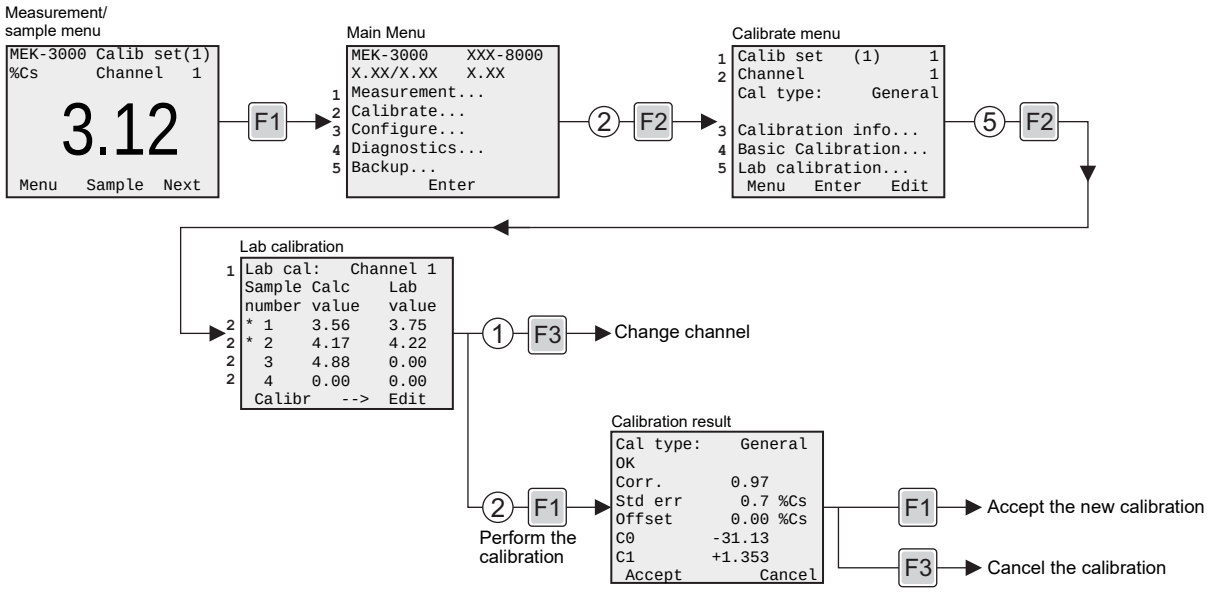
	Cursor position	Action
A	Sample activation column	Activate a sample to be included in the next calibration, or deactivate an activated sample. Activated samples are designated by an asterisk in this column.
B	Sample number column	Delete the selected sample.
C	Calculated value column	Display extended information about the selected sample. This includes sample date, sample time, the difference between calculated value and lab value, and raw values.
D	Lab value column	Edit lab value for the selected sample.

Only four samples are displayed on the view at the same time. To access the rest of the samples, use the up/down arrow buttons to scroll the list.


Measurement/
sample menu
MEK-3000 Calib set(1)
%Cs Channel 1
3.12
Menu Sample Next
F1
Main Menu
MEK-3000 XXX-8000
X.XX/X.XX X.XX
1 Measurement...
2 Calibrate...
3 Configure...
4 Diagnostics...
5 Backup...
Enter
2
F2
Calibrate menu
1 Calib set (1) 1
2 Channel 1
Cal type: General
3 Calibration info...
4 Basic Calibration...
5 Lab calibration...
Menu Enter Edit
5
F2
Lab calibration
Lab cal: Channel 1
Sample Calc Lab
number value value
* 1 3.56 3.75
* 2 4.17 4.22
3 4.88 0.00
4 0.00 0.00
Calibr --> Edit
1
F3
Change channel
2
F2
Move cursor position to next column
A
Activate/Deactivate sample
Delete sample
Calib set 1
Delete sample: 2
Delete Cancel
B
F1
Delete sample
2
F3
Sample information
Sample info:
2020-01-01 12.36.50
Lab - Calc: 0.05
RawValue XX 9.461
Back Edit
C
D
Edit lab value

8.5.4.2 Perform Lab Calibration

The procedure to perform a lab calibration is shown in the image below. Only activated samples (indicated by an asterisk, see section 8.5.4.1: *Sample Management*) will be included in the calibration.

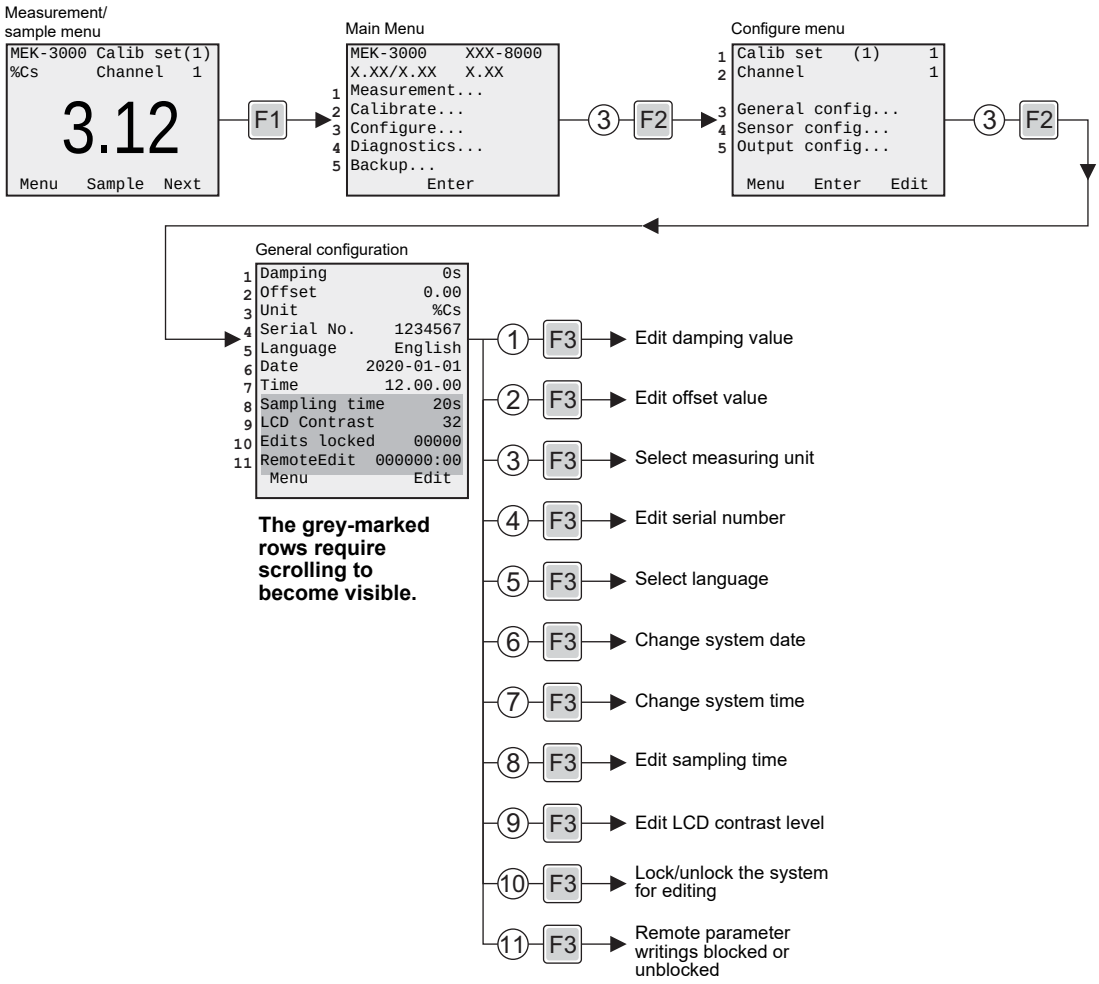


The parameters in the Calibration result view are as follows

Parameter	Description	Explanation
Cal type	The calibration type	The calibration method used to calculate the calibration will be displayed. If the calibration is unsuccessful, the calibration type of the previous (and still valid) calibration will be displayed.
OK	This row shows the status of the calibration	*OK* indicates that the calibration was successful. An unsuccessful calibration will provide an instrument specific error message. See the trouble shooting section of the instrument manual for further advice.
Corr.	The correlation coefficient	
Std err	The standard error	
Offset	Offset adjustment of known error in the calibration (always reset to zero when a new lab calibration is performed)	
C0, C1, C2...	Calibration constants	The number of constants varies depending on instrument type. If there are more than two constants, the view can be scrolled using the up/ down arrow buttons.

8.6 Configure Menu

8.6.1 General Configuration

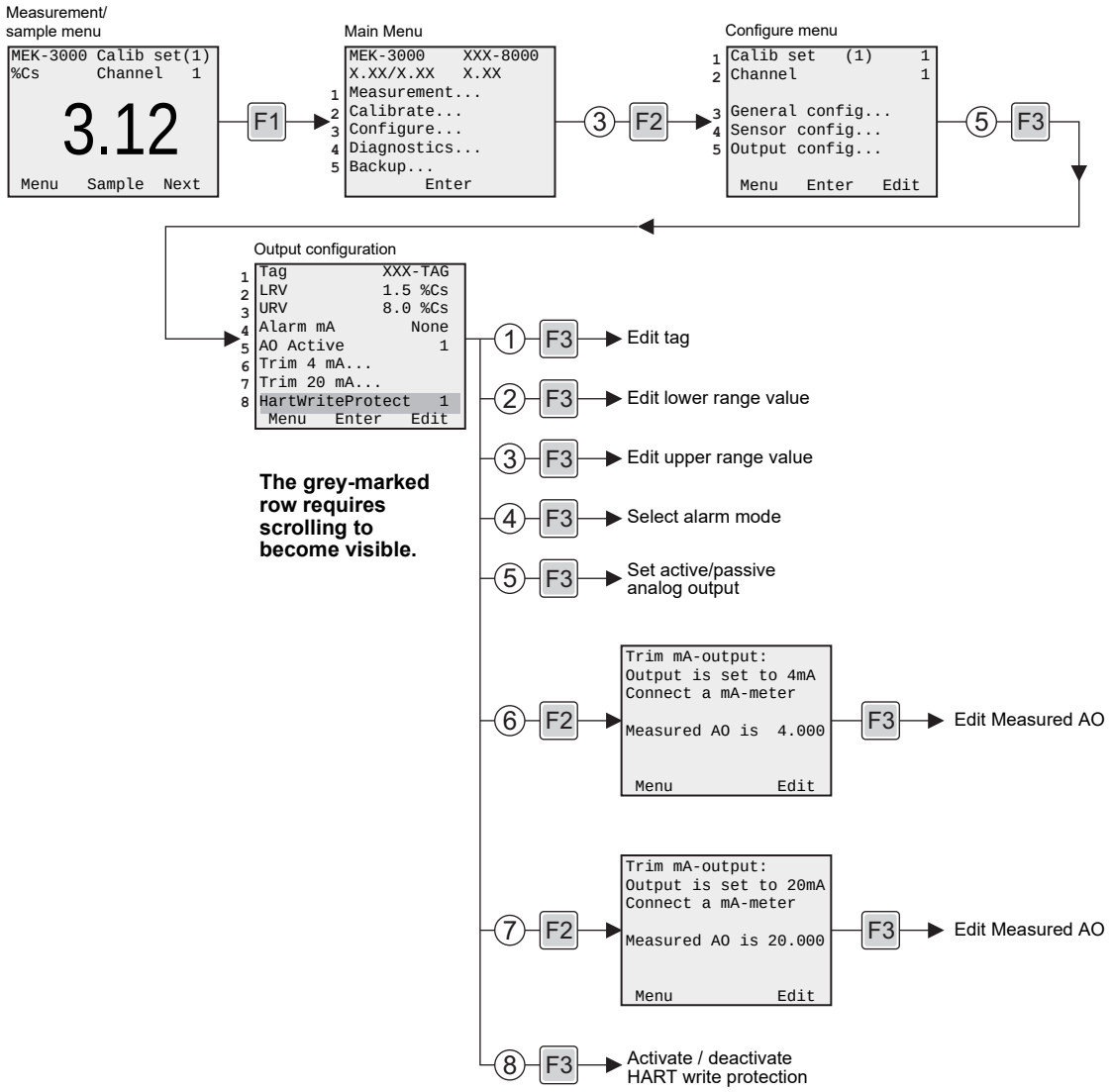


The input parameters for general configuration are as follows:

Parameter	Description	Explanation
Damping	A damping constant that can be set after calibration to stabilize the signal	A higher damping value will increase the damping of the signal. The unit and valid range of the damping constant depends on the instrument.
Offset	Offset adjustment of known error in the calibration (always reset to zero when a new lab calibration is performed)	
Unit	The engineering unit of the displayed measuring result	Selected from a list of available units.
Serial No.	The serial number of the instrument	Factory preset value Should normally not be changed unless it has been reset and needs to be recovered
Language	The display language	Selected from a list of available languages.
Date	The system date	Specified in the format YYYY-MM-DD
Time	The system time	Specified in the format HH.MM.SS
Sampling time	The time used by the instrument to take each sample	The mean measurement value during the sampling time is saved to the instrument.
LCD Contrast	Contrast level of the LCD display	Can be adjusted within the interval 23 - 40.
Edits locked	Function for locking all settings for editing	The current lock status is designated by the displayed digit: 00000: The system is currently unlocked. 00001: The system is currently locked.
RemoteEdit	This parameter defines whether parameter writings from remote devices (PC, Modem, CCM-8x00) to HCM/FCM and instrument are blocked or unblocked.	000000:00 = parameter writings blocked. hhhhhh:mm = number of hours and minutes the parameter writings are unblocked. When RemoteEdit has counted down to 000000:00 parameter writings are blocked automatically.

8.6.2 Output Configuration

8.6.2.1 Output configuration for the HART Communication Module, HCM-8000:

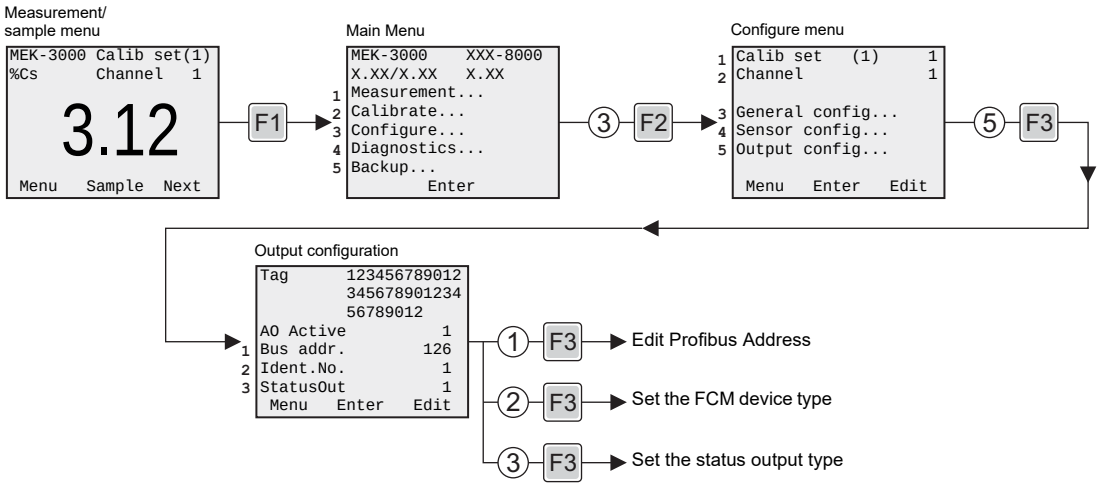


The input parameters for Output configuration are as follows:

Parameter	Description	Explanation
Tag	The instrument identification name	Maximum eight characters
LRV	Lower measuring range value, represented by an output signal of 4 mA	
URV	Upper measuring range value, represented by an output signal of 20 mA	

Parameter	Description	Explanation
Alarm mA	Defines the behavior of the analog 4-20 mA output signal when an alarm is activated	The following alarm modes are available: **High**: Sets and locks the analog output signal to approximately 22.5 mA **Low**: Sets and locks the analog output signal to approximately 3.3 mA **Hold**: Locks the analog output signal to its present level **None**: No action
AO Active	This parameter defines whether active or passive analog output is used.	1 = Active analog output 0 = Passive analog output **Note:** For HCM-8010, this parameter cannot be changed since HCM-8010 always uses active output.
Trim 4 mA...	Trimming function for the analog output at 4 mA	To trim the analog output for 4 mA, connect an mA-meter to the analog output and note the measured current. Then press the Edit (F3) key and enter the measured current value. The analog output is now trimmed to exactly 4 mA. See the Installation Instruction chapter of this manual for connection instructions.
Trim 20 mA...	Trimming function for the analog output at 20 mA	To trim the analog output for 20 mA, connect an mA-meter to the analog output and note the measured current. Then press the Edit (F3) key and enter the measured current value. The analog output is now trimmed to exactly 20 mA. See the Installation Instruction chapter of this manual for connection instructions.
HartWriteProtect	This parameter defines whether HART write protection is activated or deactivated.	HART write protection disables all HART “write”-commands. HART write protection is by default activated. 1 = HART write protection activated 0 = HART write protection deactivated

8.6.2.2 Output configuration for the Fieldbus Communication Module, FCM-8000

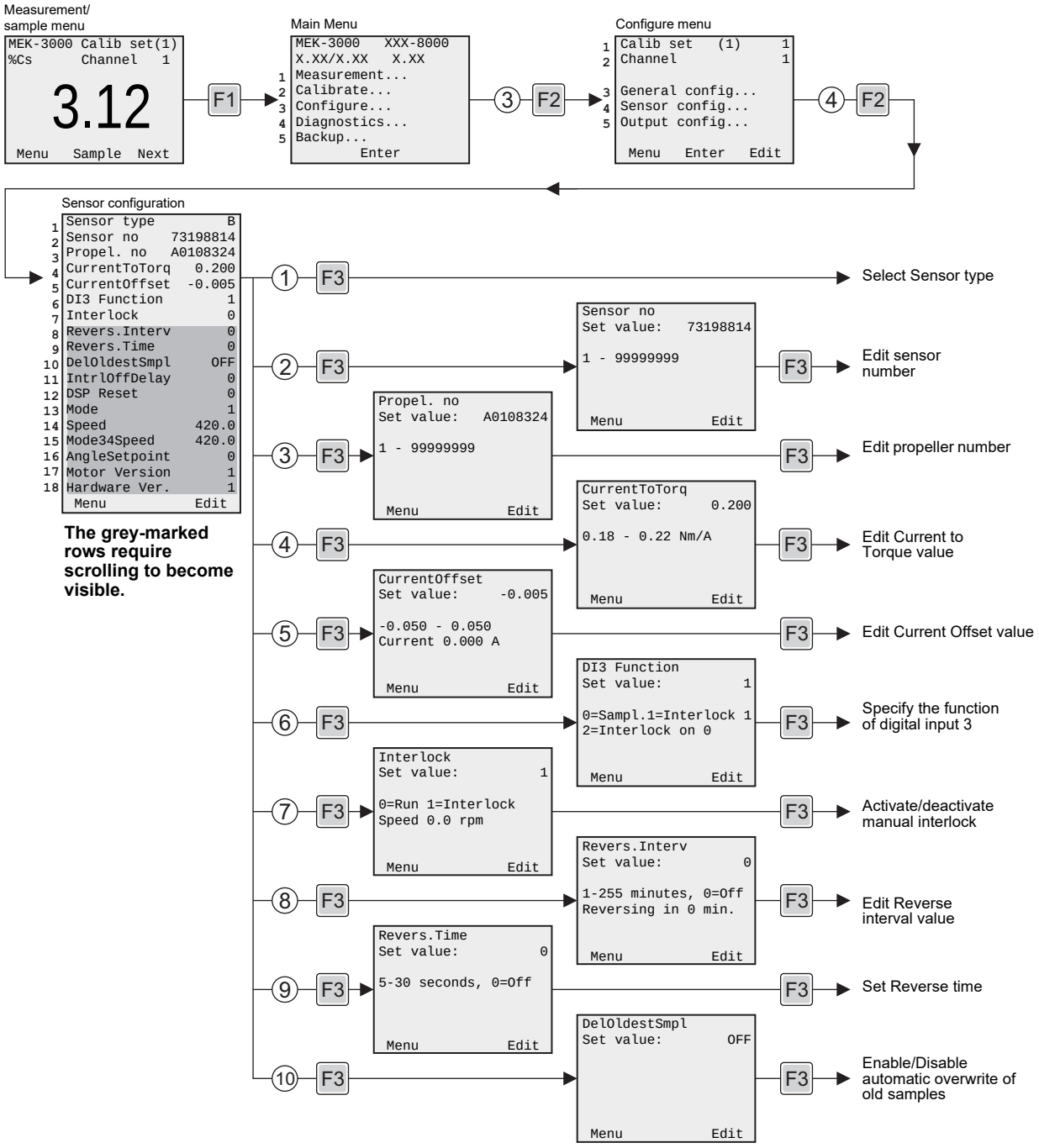


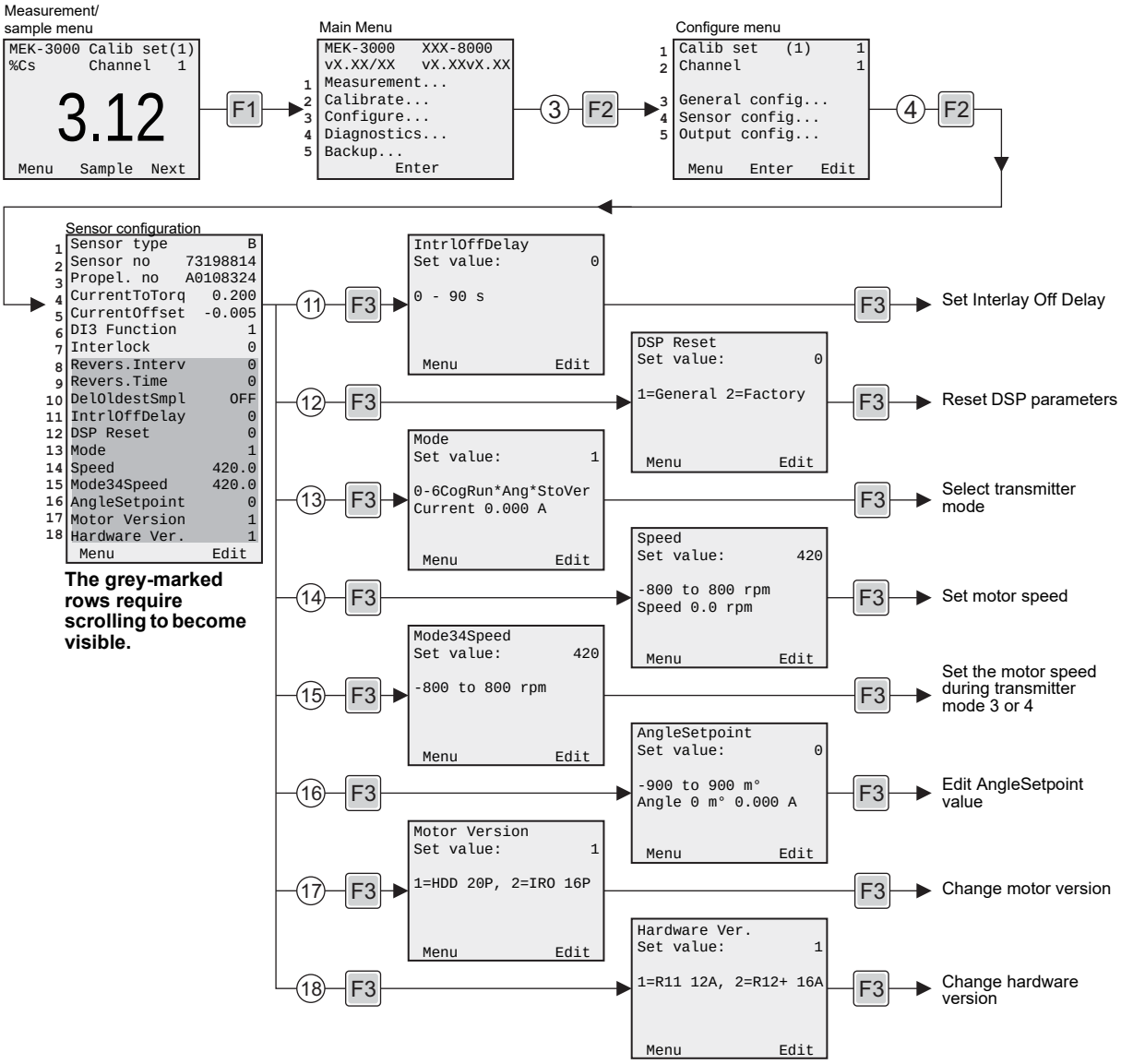
The input parameters for Output configuration are as follows:

Parameter	Description	Explanation
Tag	The instrument identification name	32 characters, read-only
AO Active	This parameter defines whether active or passive analog output is used.	This parameter is only valid and visible for FCM-8010. Since FCM-8010 always uses active output, this parameter cannot be changed.
Bus addr.	The identification address of the Profibus Communication Module	The address can be set in the interval 0-125. The address is set to 126 at delivery.
Ident.No.	Defines the type of device the FCM presents itself as to the Profibus system	0 = “Profile specific”. FCM can only be used with a generic GSD file not readily accessible giving limited functionality. 1 = “Manufacturer specific”. FCM can be used with BTG's GSD file giving full functionality. BTG’s PDM driver can also be used.
StatusOut	This parameter controls what type of profibus-status information that is sent out for process values.	0 = Always send profibus-status *Quality Good and Not Limited* (default). 1 = Pass through the actual profibus-status from the instrument.

8.6.3 Sensor Configuration

Sensor configuration for the MEK-3000. Most sensor configuration parameters are factory preset and should normally not be changed unless they have been reset and needs to be recovered, or if the sensing element, propeller, or electronics card are changed.




Measurement/
sample menu
MEK-3000 Calib set(1)
%Cs Channel 1
3.12
Menu Sample Next
F1
Main Menu
MEK-3000 XXX-8000
vX.XX/XX vX.XXvX.XX
1 Measurement...
2 Calibrate...
3 Configure...
4 Diagnostics...
5 Backup...
Enter
3
F2
Configure menu
1 Calib set (1) 1
2 Channel 1
3 General config...
4 Sensor config...
5 Output config...
Menu Enter Edit
4
F2
Sensor configuration
1 Sensor type B
2 Sensor no 73198814
3 Propel. no A0108324
4 CurrentToTorq 0.200
5 CurrentOffset -0.005
6 DI3 Function 1
7 Interlock 0
8 Revers.Interv 0
9 Revers.Time 0
10 DelOldestSmpl OFF
11 IntrlOffDelay 0
12 DSP Reset 0
13 Mode 1
14 Speed 420.0
15 Mode34Speed 420.0
16 AngleSetpoint 0
17 Motor Version 1
18 Hardware Ver. 1
Menu Edit
The grey-marked rows require scrolling to become visible.
11 F3
IntrlOffDelay
Set value: 0
0 - 90 s
Menu Edit
F3
Set Interlay Off Delay
12 F3
DSP Reset
Set value: 0
1=General 2=Factory
Menu Edit
F3
Reset DSP parameters
13 F3
Mode
Set value: 1
0-6CogRun*Ang*StoVer
Current 0.000 A
Menu Edit
F3
Select transmitter mode
14 F3
Speed
Set value: 420
-800 to 800 rpm
Speed 0.0 rpm
Menu Edit
F3
Set motor speed
15 F3
Mode34Speed
Set value: 420
-800 to 800 rpm
Menu Edit
F3
Set the motor speed during transmitter mode 3 or 4
16 F3
AngleSetpoint
Set value: 0
-900 to 900 m°
Angle 0 m° 0.000 A
Menu Edit
F3
Edit AngleSetpoint value
17 F3
Motor Version
Set value: 1
1=HDD 20P, 2=IRO 16P
Menu Edit
F3
Change motor version
18 F3
Hardware Ver.
Set value: 1
1=R11 12A, 2=R12+ 16A
Menu Edit
F3
Change hardware version

The input parameters for Sensor configuration are as follows

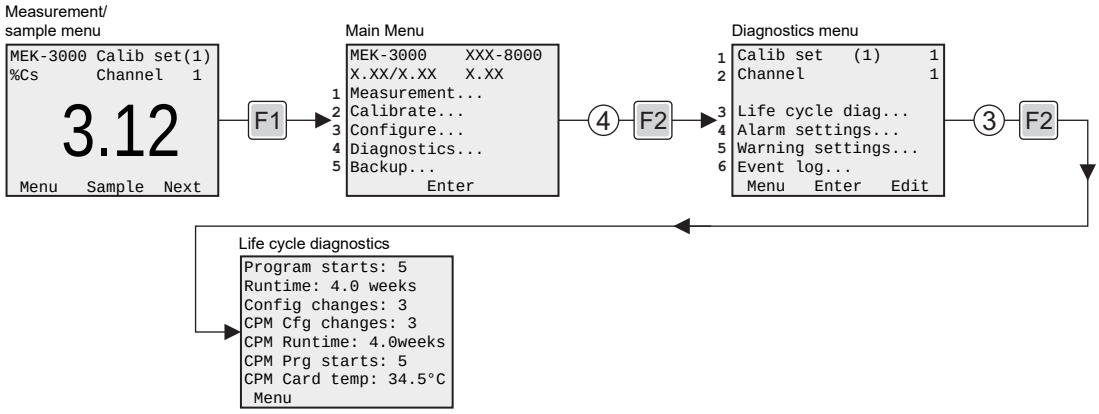
Parameter	Description	Explanation
Sensor type	The MEK-3000 sensing element type.	Factory preset value. If the sensing element type is changed, the new type must be specified here. Note that changing this setting affects the output measuring range settings, and the water value sample.
Sensor no	The BTG ordering number of the installed sensing element.	Factory preset value.
Propel. no	The BTG ordering number of the installed propeller or hub.	Factory preset value.
CurrentToTorq	The conversion factor for conversion between motor current and torque. Used for normalization of the transmitter.	Factory preset value. When adjusting this value, the transmitter must be running with a torque break mounted. Set the torque break to 150 kpmm and observe the new value on the second help line in this view (the line displaying *150 kpmm > x.xxx Nm/A*, where x.xxx is the new value). Then enter this value as the new *CurrentToTorq* parameter value.
CurrentOffset	Offset parameter for setting the motor current to zero at zero torque.	Factory preset value. When adjusting this value, the transmitter must be running in air. Observe the current value on the second help line in this view, and enter the corresponding negative value (or positive value, if the current value is negative) as the new *CurrentOffset* parameter value.
DI3 Function	This parameter defines the function of Digital Input 3 (DI3).	The following functions are available: 0: Sampling mode. DI3 is used for remote sampling 1: High Interlock mode (Default). When DI3 is high (+24 VDC) the unit goes into interlock, which turns off the transmitter motors. 2: Low Interlock mode. When DI3 is low (0 VDC) the unit goes into interlock, which turns off the transmitter motors.

Parameter	Description	Explanation
Interlock	Manual interlock function.	If the function of digital input 3 (see parameter *DI3 Function* above) is set to interlock, this parameter works a read-only indicator of the interlock status. Otherwise, this parameter can be used to manually activate the interlock function, that is, turn of the motors. The following functions are available: 0: Normal operation 1: Interlock state
Revers.Interv	A function that allows the transmitter to alternate the rotation direction of the sensing element in intervals.	This function is especially useful to get rid of stuck sludge from the sensing element. The function is activated by setting the parameter value to the desired interval time (1-255) minutes. Setting the value to 0 (default) deactivates the function. During reverse, the output signal is frozen.
Revers.Time	This parameter specifies the reverse time of each reverse interval (see parameter *Revers.Interv* above).	The reverse time can be set between 5 and 30 seconds. Setting the value to 0 deactivates the reverse interval function.
DelOldestSmpl	This parameter defines how sampling is handled when the sample table is full.	By default, this parameter is set to OFF, which means that a warning will be displayed when the sample table is full, as described in section 9.4.4.1: *Sample Table Full*, and samples must be deleted manually before new samples can be saved. When set to ON, no warning will be displayed when the sample table is full, and the oldest sample will be overwritten without further notice.
IntrlOffDelay	Interlock Off delay. Delay time before the MEK-3000 starts measuring after release from interlock.	The delay time can be set between 0 and 90 seconds. The delay time is by default set to 0.
DSP Reset	Reset function for the advanced DSP parameters.	The following reset functions are available: 1: Restores parameter *Mode*, *Speed*, and *Mode34Speed* to their default values (General). 2: Sets parameter *AngleSetpoint* and *Motor Version* to zero (Factory).

Parameter	Description	Explanation
Mode	Available modes for advanced transmitter adjustments.	0: Cog space mode - Shows the cog space value between the two cog wheels. 1: Run mode - Normal operation. 3: Angle Setpoint mode - Automatic adjustment of the *AngleSetpoint* parameter value. 5: Mechanical stop mode - Automatic check of max. and min. angle values for adjustment of mechanical stop. 6: Detect Hardware mode - Detect motor version and hardware version (see parameters Motor Version and Hardware Ver. below). For correct results, the transmitter must be running in air when set to mode 3, 5, or 6.
Speed	The motor speed setpoint value.	Factory preset value. The actual motor speed value is also shown in the this view.
Mode34Speed	The motor speed during transmitter mode 3 or 4 (see parameter *Mode* above).	Factory preset value.
AngleSetpoint	The angle difference setpoint value.	Factory preset value. This parameter is automatically adjusted by setting the transmitter to mode 3 (see parameter *Mode* above). The actual angle difference value is also shown in this view.
Motor Version	This parameter specifies which motor version that is used.	Two ensure high availability, motors from two different suppliers are used. Both motors have the same performance but have different number of poles. 1: HDD supplier with 20 poles. 2: IRO supplier with 16 poles. The motor version is automatically detected by setting the transmitter in Detect Hardware mode (Mode 6, see the description for parameter *Mode*).
Hardware Ver.	This parameter specifies which electronic hardware version that is used.	The maximal torque differs depending on the electronic hardware components used. Two different hardware versions are available. 1: R11 with max 12 ampere current. 2: R12+ with max 16 ampere current. The hardware version is automatically detected by setting the transmitter in Detect Hardware mode (Mode 6, see the description for parameter *Mode*).

8.7 Diagnostics Menu

8.7.1 Life Cycle Diagnostics



The following Life cycle diagnostics are common for all instruments:

Parameter	Description
Program starts	The number of times the instrument has been started
Runtime	The total instrument runtime, specified in number of weeks.
Config changes	The number of times the instrument's configuration has been changed.
CPM Cfg changes	The number of times the CPM’s configuration has been changed.
CPM Runtime	The total CPM runtime, specified in number of weeks.
CPM Prg starts	The number of times the CPM has been started
CPM Card temp	The present temperature at the HCM or FCM electronics card. **Note:** For older CPM cards that do not have temperature sensors, a “-” is shown on the display instead of the temperature.
CPM Edit locks	The number of times the instrument have been locked for changes.

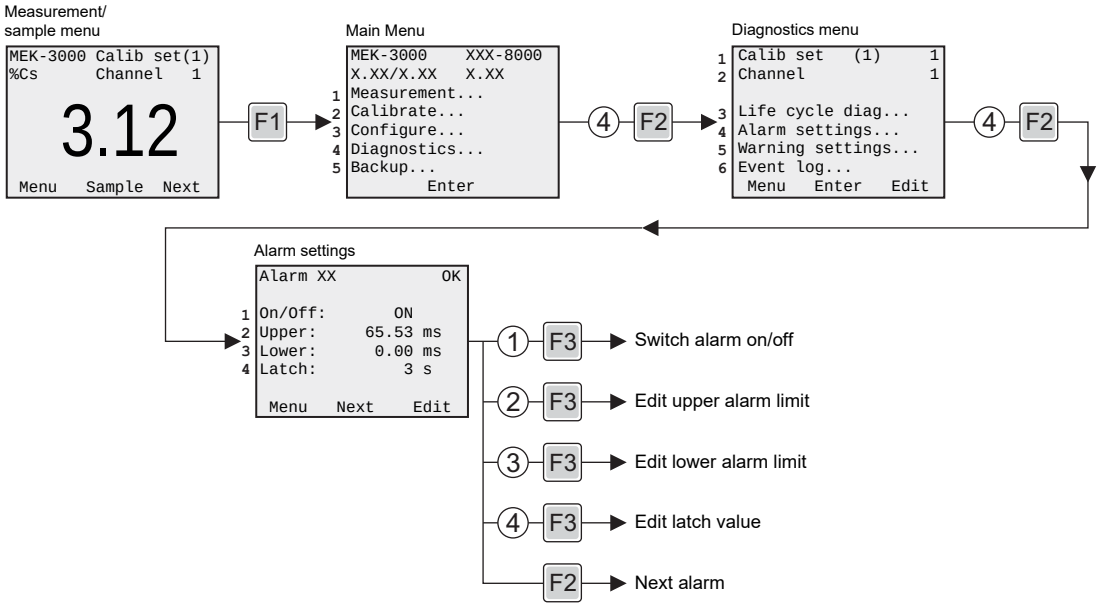
Any instrument specific life cycle diagnostics are further described in the appendix section of this manual.

8.7.2 Configure Alarm Settings

Configuration of the instrument's alarm functions is performed from the Alarm settings view. The available alarm functions are specific for each instrument type, but most alarms have configurable upper and lower alarm limits, and can be turned on/off.

An active alarm is indicated in the M*easurement/Sample menu* by the letter "A" blinking in the upper right corner of the display. Detailed information on active alarms is shown in the status view (see section 8.4.1: *View Device Status*), and all alarms are logged in the event log (See section 8.7.4: *View Event Log*).

The specific alarms for the current instrument are further described in the appendix section of this manual.



The input parameters for alarm settings are as follows

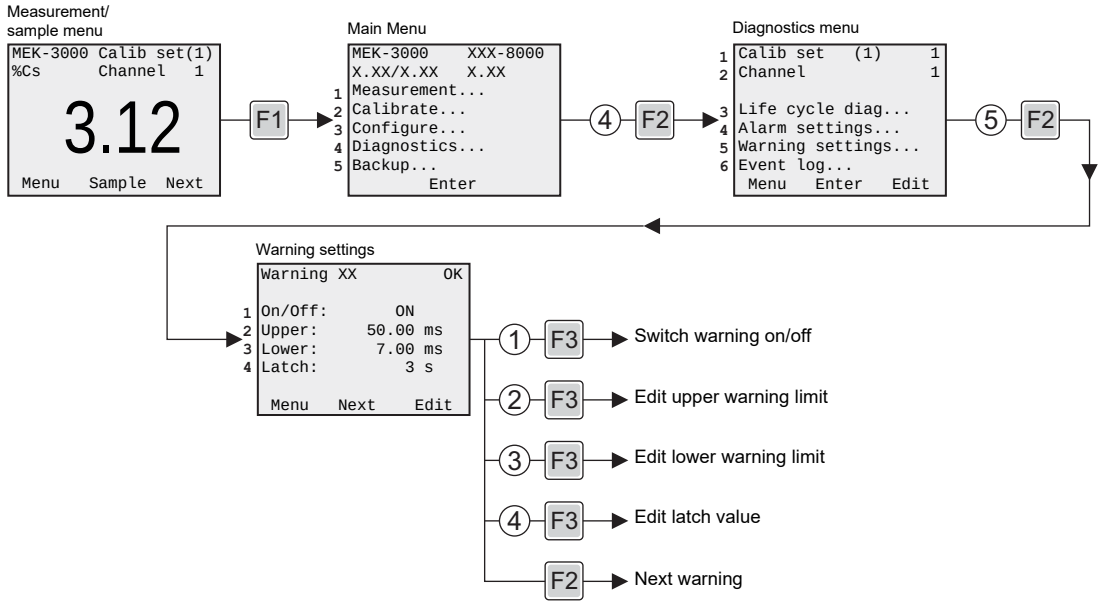
Parameter	Description	Explanation
On/Off	Switch the alarm function on or off	
Upper	Upper alarm limit (unit depends on selected alarm)	
Lower	Lower alarm limit (unit depends on selected alarm)	
Latch	Latch is a function that prevents the alarm being subject to oscillation or repeated activation-deactivation cycles.	Normally, the latch is an alarm activation delay, i.e. the time that the alarm limit must be exceeded before the alarm is triggered. When this is the case, the latch unit is seconds (s). Alternatively, for some alarms the latch is used to set the deadband, which is an area of the signal range around the alarm limits where no activation/deactivation of the alarm occurs. When this is the case, the latch unit is the same as for the alarm limits.

8.7.3 Configure Warning Settings

Configuration of the instrument's warning functions is performed from the Warning settings view. The available warning functions are specific for each instrument type, but most warnings have configurable upper and lower alarm limits, and can be turned on/off.

Unlike for alarms, there is no indicator that shows that a warning is active. However, detailed information on active warnings is shown in the status view (see section 8.4.1: *View Device Status*), and all warnings are logged in the event log (See section 8.7.4: *View Event Log*).

The specific warnings for the current instrument are further described in the appendix section of this manual.

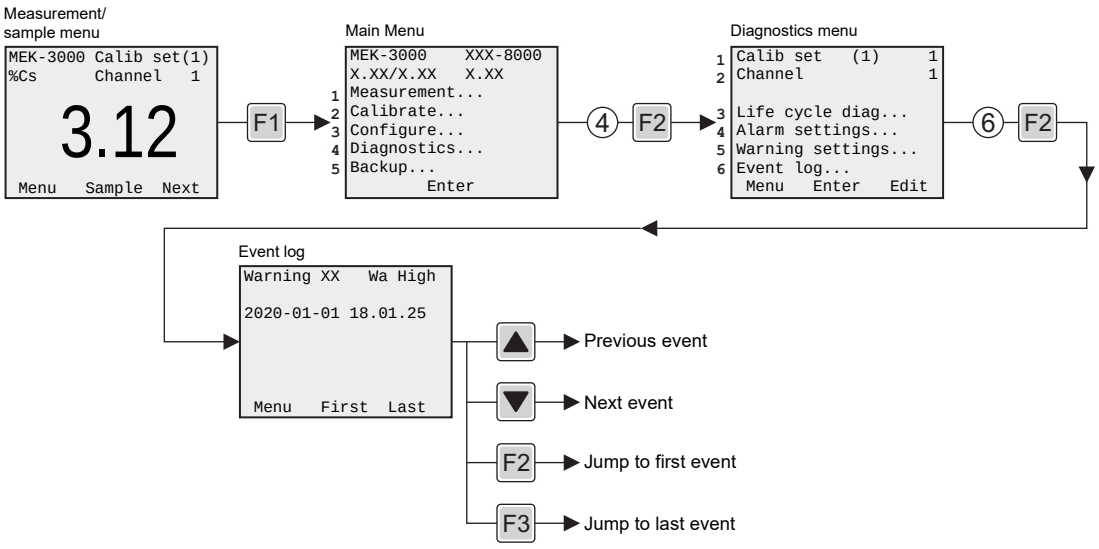


The input parameters for warning settings are as follows:

Parameter	Description	Explanation
On/Off	Switch the warning function on or off	
Upper	Upper warning limit (unit depends on selected warning)	
Lower	Lower warning limit (unit depends on selected warning)	
Latch	Latch is a function that prevents the alarm being subject to oscillation or repeated activation-deactivation cycles	Normally, the latch is a warning activation delay, i.e. the time that the warning limit must be exceeded before the warning is triggered. When this is the case, the latch unit is seconds (s). Alternatively, for some warnings the latch is used to set the deadband, which is an area of the signal range around the warning limits where no activation/deactivation of the warning occurs. When this is the case, the latch unit is the same as for the warning limits.

8.7.4 View Event Log

All events, such as system start-up, activation and deactivation of alarms and warnings, etc. are stored in the event log. Each event can be displayed with date and time in the Event log view.



8.8 Backup Menu

8.8.1 Store Data on a Memory Card

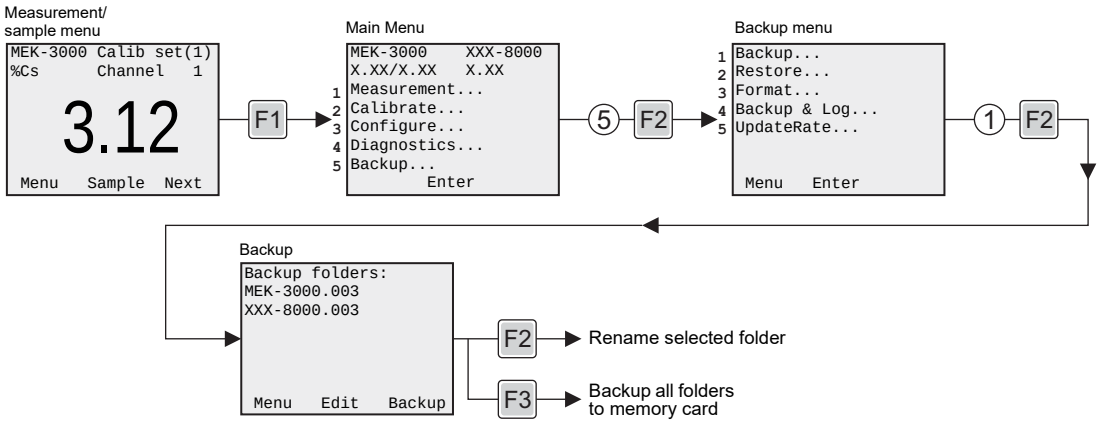
All instrument settings, instrument data, and calibration data can be stored on a memory card of the type Secure Digital (SD/SDHC/SDXC). The SD card reader is located on the communication module card, and can be accessed by opening the front cover of the CPM.

NOTE!
The memory cards must be formatted with the FAT16 file system (which have a maximum partition size of 2 GB). Regular SD cards must be formatted externally from a PC, while SDHC/SDXC cards can be formatted directly from the CPM via the *Format* view. See section 8.8.3: *Format Memory Card* for more information.

Backup is made to two folders, one for communication module data, and one for sensor and calibration data. Default names for these folders are proposed when entering the Backup view. However, the folder names can be changed to any name with a maximum of eight characters.

Two files, *.bcf and *.htm (where * is the same as the default folder name), are stored into each folder. The *.bcf file is the backup file used by the instrument, and the *.htm file is a report of the backup in HTML-format, which can displayed in any browser on a PC.

Both folders are always stored at the same time when a backup is made.



NOTE!
Instruments with multiple operational modes should always be put in Service mode before making backup or restore. If applicable, see chapter 8.6: *Configure Menu*, section *Sensor Configuration,* for more information about available operational modes.

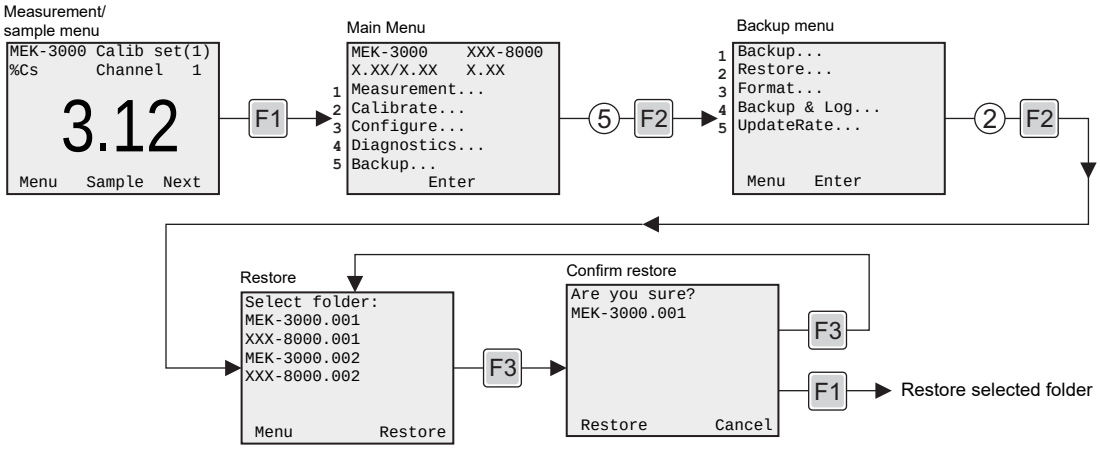
8.8.2 Restore Data from a Memory Card

All available backup folders on a memory card are shown when entering the Restore view. If there are more than six folders on a card, the view can be scrolled using the scroll keys.

The folders for communication module data, and for sensor and calibration data must be restored separately.

Note that to allow calibration data and instrument settings to be transferred between instruments, factory preset settings for individual instruments will not be restored when using the restore function. If these settings need to be restored, the values must be read from the HTML-files (which were created during the backup) and manually entered.

A maximum of 30 backups can be shown/selected for restoration. If more backups have been saved, the least relevant ones can be moved or deleted from the memory card using the file manager on a PC. It is not possible to delete backup folders and files from a SD card using the CPM.



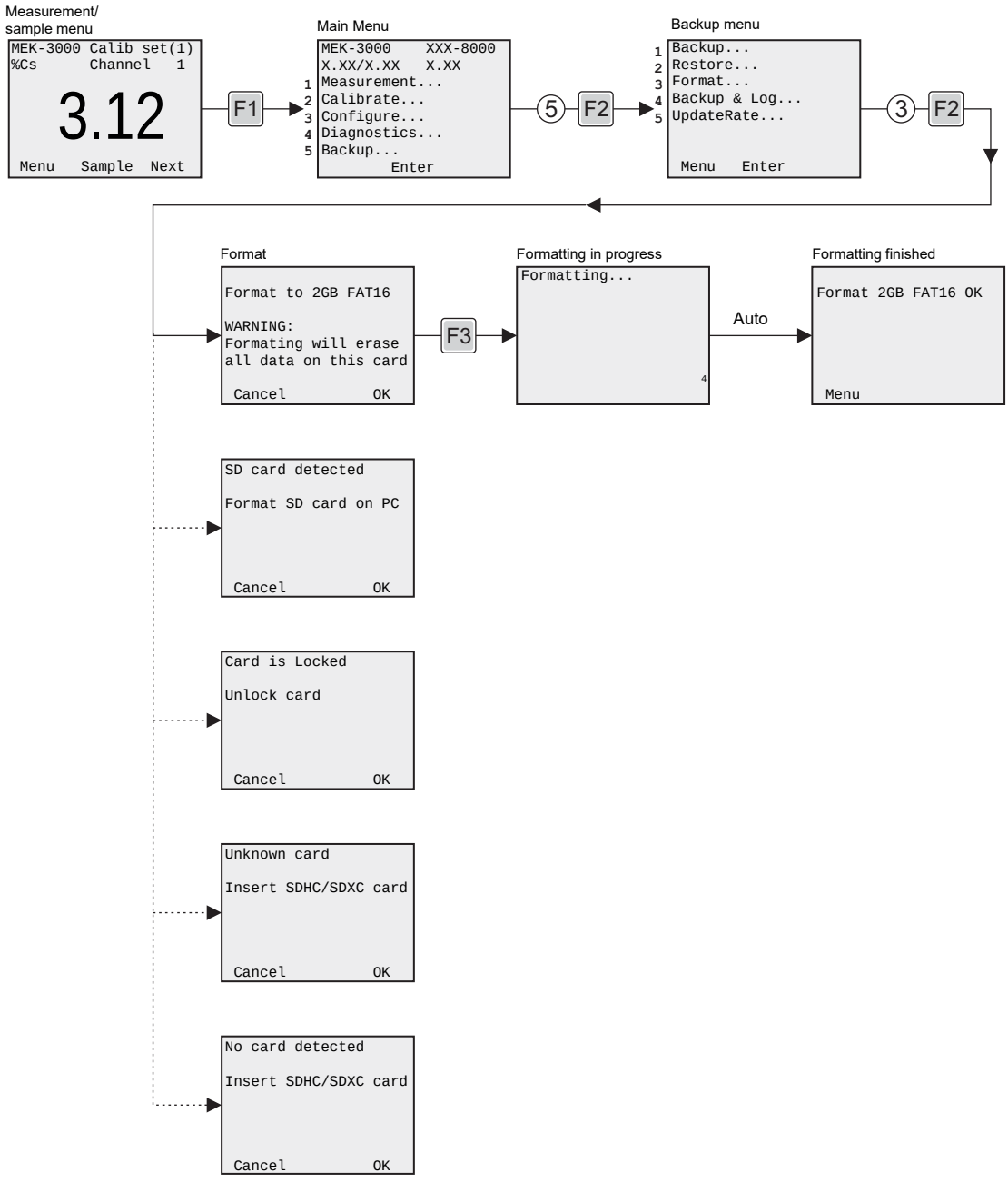
NOTE!
Instruments with multiple operational modes should always be put in Service mode before making backup or restore. If applicable, see chapter 8.6: *Configure Menu*, section *Sensor Configuration,* for more information about available operational modes.

8.8.3 Format Memory Card

Memory cards of the type SDHC and SDXC can be formatted for backup usage directly from the CPM via the *Format* view. Regular SD cards must be formatted to the file format FAT16 from a PC.

When the Format view is accessed, and a valid SDHC/SDXC card is detected, a warning message will appear. Pressing **OK (F3)** will start the formatting process. The formatting takes six seconds and a countdown timer will show the remaining time until the process is finished.

If the Format view is accessed and no valid, or unlocked, SDHC/SDXC card is detected, an error message will appear with a short description and solution of the problem. Pressing **OK (F3)** will check again for a valid card and try to perform the formatting.



8.8.4 Store Data and Log Tables on Memory Card

Initially, the *Backup & Log* view looks exactly the same as the *Backup* view, and the backup process is performed in the same way as described in section 8.8.1: *Store Data on a Memory Card*. However, when the backup is finished, logging of tables is automatically initiated.

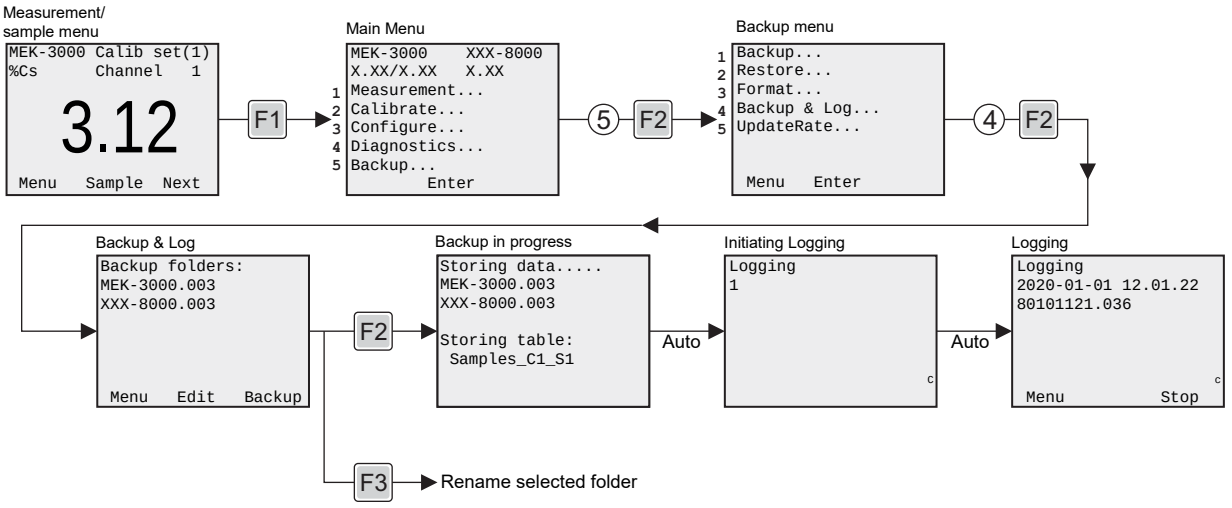
During the initiation of the logging, all loggable tables are indexed and scanned. A digit on the display indicates which table is being processed. When the initiation is complete, one file for each table is created on the SD card. The filename of each file is determined by the creation time and date of the file, and will be shown on separate rows on the display. For example, a file created on 2018-01-01 at 12.10.36 will be named 80101121.036.

After a short while, the filenames on the display are replaced by the date and time of the latest logged data from each table. The date and time stamps are continuously updated as long as logging is in progress. The logging update rate is determined by the parameter *UpdateRate*, which can be found in the *Update Rate* view (see section 8.8.5: *Configure Logging Update Rate*).

While logging is in progress, a logging indicator appears as a blinking letter ‘C’ in the lower right area of the display. It is possible to leave the *Logging* view and perform other tasks from other menus while logging is in the progress, and the logging indicator be visible everywhere in the menu structure. However, while logging is in process, the sub-menus of the *Backup menu* are unavailable, and trying to accessing the *Backup menu* will lead directly back to the *Logging* view.

There are two tables common for all instruments which are always being included during logging. Those are Results (raw values, measuring values, diagnostics etc.) and Events (alarms, warnings, and status messages). For some instruments, additional loggable tables may also exist.

NOTE!
Logged data can only be accessed by BTG personnel through a specific software from BTG.

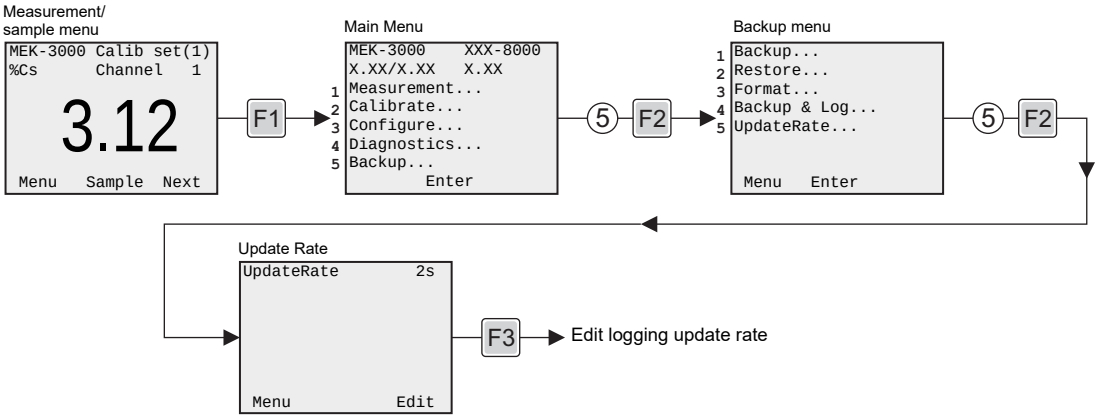


8.8.5 Configure Logging Update Rate

The *Update Rate* view contains a single parameter (*UpdateRate*), which specifies how often the instrument is allowed to buffer results for retrieval by BTG-Log, BTG Software, and CPM SD card logging.

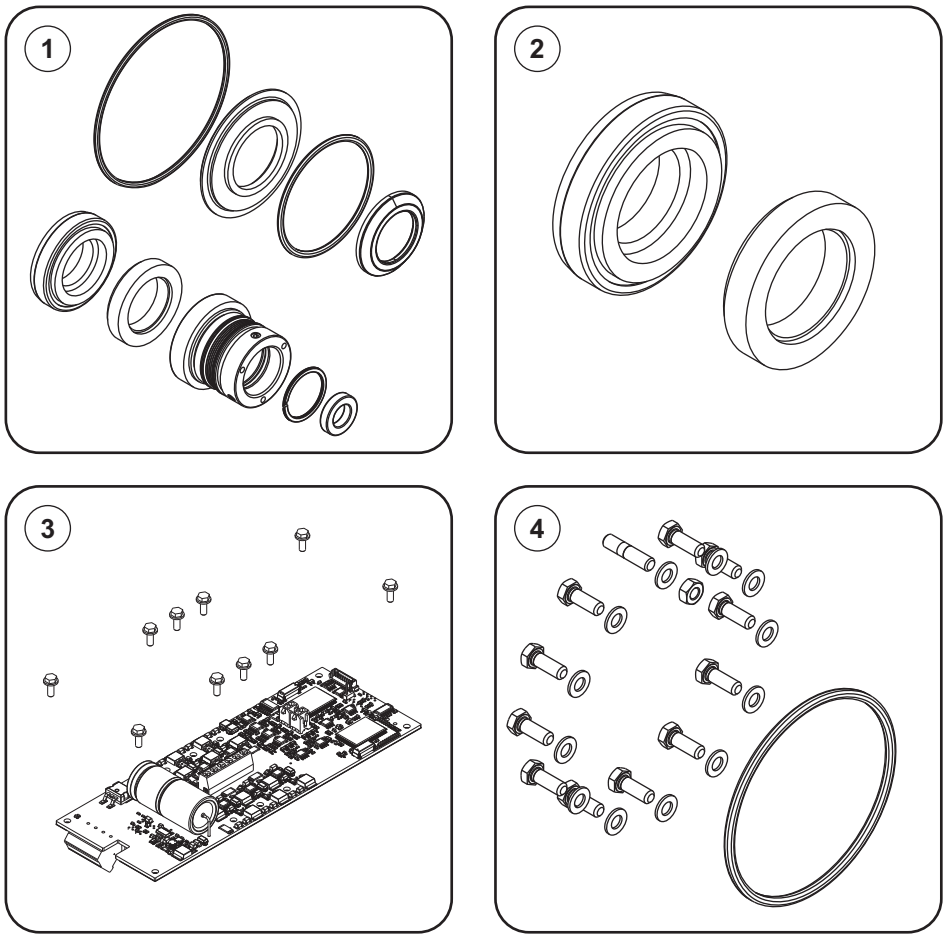
If set to 0, there is no time limitation and all results from the instrument will be buffered.

For instruments which produces multiple results per second, SD card logging can never catch up with an update rate set to 0 s and is on the limit with 1 s, but copes well with 2 s. Depending on the purpose of logging, 10, 60 or 600 s avoids getting flooded with too much data.



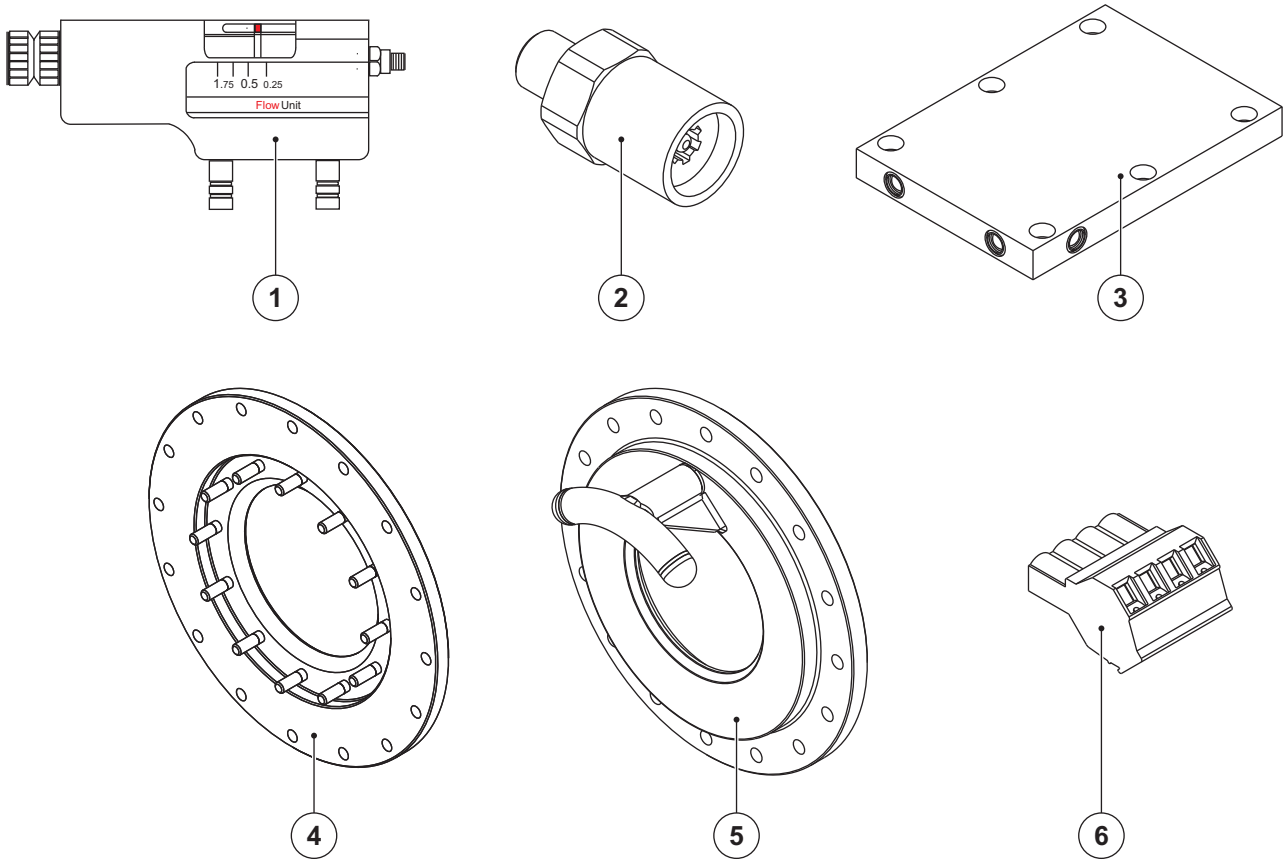
9 Parts List

9.1 Spare Parts



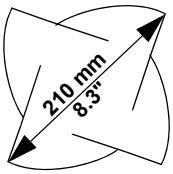
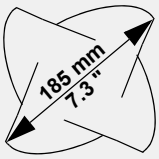
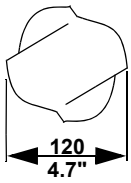
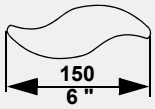
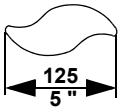
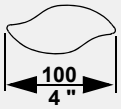
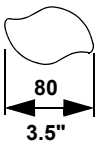
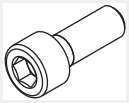
Item No.	Rec. spare parts	Qty	Service Kit	Part No.	Description
1	*	1	Sealing kit	HB0021600	Mech. sealing: Metal bellow, SS/FPM
				HB0021618	Mech. sealing: Metal bellow, SS/EPDM
				HB0103275	Mech. sealing: Metal bellow, SMO/FPM
				HB0021626	Mech. sealing: Roplan Type, SS/FPM
				HB0021634	Mech. sealing: Roplan Type, SS/EPDM
				HB0101709	Mech. sealing: Roplan Type, SMO/FPM
2	*	1	Secondary sealing kit	HB0021659	
3	*	1	Electronics card kit	HB0021667	
4	*	1	Mounting kit	HB0021675	Flange Ø180 mm, FPM
				HB0021683	Flange Ø180 mm, EPDM
				HB0021691	Flange Ø270 mm, FPM
				HB0021709	Flange Ø270 mm, EPDM

9.2 Accessories

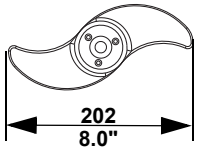
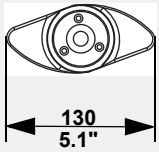


Item No.	Rec. spare parts	Qty	Service Kit	Part No.	Description
1		1	Seal water control unit	P35011089	
2	*	1	Relief valve	P35011238	
3		1	Cooling kit	HB0021717	
4		1	Adapter flange	HB0021881	PN16
				HB0101717	PN16, 254 SMO
				HB0101683	PN25
5		1	Adapter flange with protector	FB0101691	PN25
6		1	Connection plug	P46033957	

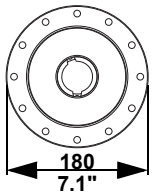
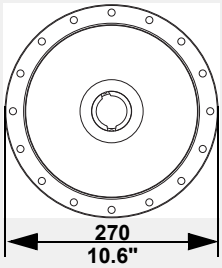
9.3 Sensing Elements

Basic Type	Part No	Characteristic shape/diam.	Material
A	P73198806 PA0004879		EN 1.4404 254 SMO
B	P73198814 PA0004887		EN 1.4404 254 SMO
C	P73198822 PA0004895		EN 1.4404 254 SMO
G	P74359761 PA0006338		EN 1.4404 254 SMO
H	P74359779 HA0006346		EN 1.4404 254 SMO
I	P74359787 HA0006353		EN 1.4404 254 SMO
J	P74359795 HA0006361		EN 1.4404 254 SMO
Sensing element screw	P15001605 P15024509		EN 1.4404 254 SMO

9.4 Propellers

Basic Type	Part No	Characteristic shape/diam.	Material
Large	PA0113936 PA0119271		EN 1.4404 254 SMO
Small	PA0119370 PA0119289		EN 1.4404 254 SMO
Hub	PA0102335 PB0021501		EN 1.4404 254 SMO

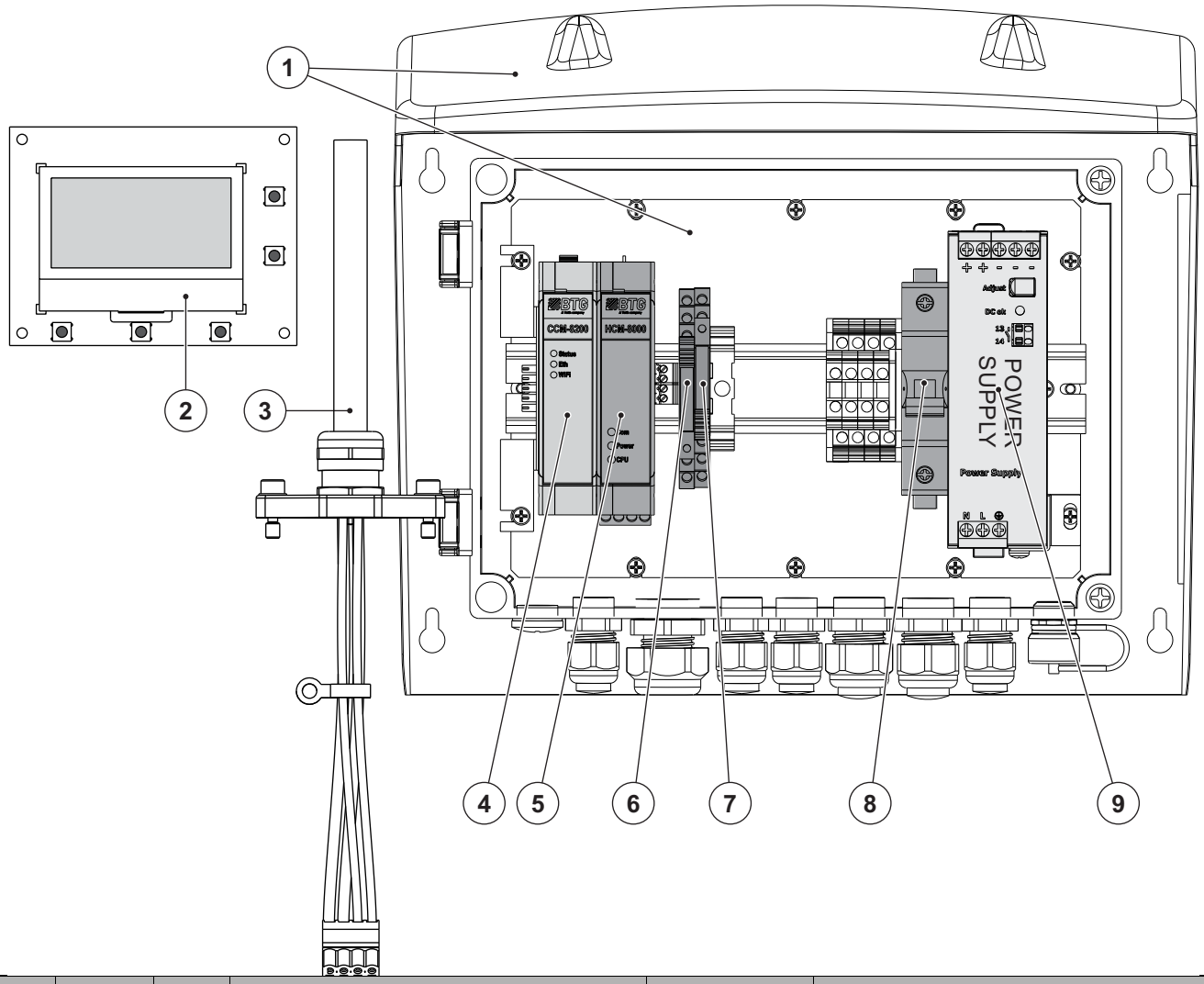
9.5 Flanges

Basic Type	Part No	Characteristic shape/diam.	Material
Small	PA0113522 PB0021543		EN 1.4404 254 SMO
Large	PA0108399 PB0021907		EN 1.4404 254 SMO

9.6 CPM

Most CPM spare parts are delivered in kits. Each kit includes instructions.

9.6.1 CPM-1400 with HCM/FCM-8000



Kit No.	Rec. spare parts	Qty	Spare Part	Part No.	Description
1		1	Console kit large	PB2000196	Without electronics Including: Protective cover, Display holder, Front tape, Attachments
2		1	Display card kit	PB0011049	Including: Cable
3		1	Sensor cable compl. CPM-1400	PA0171090	10 m (Standard)
				PB0106112	20 m
4		1	CCM-8200 kit	PB2000197	Cloud communication module Including: Bottom socket 5 pin

Kit No.	Rec. spare parts	Qty	Spare Part	Part No.	Description
5		1	HCM-8000 kit	PB0011015	Hart communication module Including: Bottom socket, Contact for transmitter (5 pin)
			FCM-8000 kit	PB0011551	Fieldbus communication module, programmed for PROFIBUS (PA) Including: Bottom socket, Contact for transmitter (5 pin).
6		1	Interlock relay Kit	PA0119867	
7		1	Alarm relay Kit	PA0174573	
8		1	24 V Switch	P46033965	
9		1	240 W power supply kit	PB0021741	
10		1	Communication cable RS-485	HA0112953	USB (not in figure)
11		1	RS485 service connector 1	PA0150151	(not in figure)
12		1	RS485 service connector 2	FB0102780	(not in figure)
13		1	SD card Industrial	P00X20418	Memory card for back-up (not in figure)

9.6.2 CPM Accessories

Kit No.	Rec. spare parts	Qty	Spare Part	Part No.	Description
1		1	Communication cable RS-485	HA0112953	USB

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