
ESSENTIAL INSTRUCTIONS

Read this page before proceeding!

Yokogawa TechInvent AS has designed, manufactured and tested this equipment to meet national and international standards. This equipment must be installed, operated and maintained according to the instructions in this manual. In addition, the instructions following this paragraph must be adhered to. Failure to follow these instructions may cause loss of life, injury on personnel, damage on property, damage to this equipment, and invalidation of warranty.

NOTE

This manual is part of the product and contains important information. Store this manual in a safe place close to the instrument so that you can refer to it immediately. Keep this manual until you dispose of the instrument.

NOTE

If the instructions given in this manual are not understood, contact customer service for clarification.



WARNING

Follow all warnings and instructions marked on and supplied with the equipment.

NOTE

It should not be required to open the equipment enclosure.
Terminal cover in rear component of enclosure must be opened to gain access for connection of power supply and signal cables.

Chemical Injection Flow Controller

IM 23C01B01-01EN 2nd Edition

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1. Introduction

This is the user manual for FluidCom Model-S2 (hereafter referred to as FluidCom S2) chemical injection flow controller. It includes instructions for safe installation, operation and maintenance, and relevant information about the equipment.

1.1 Symbols

The following safety symbols are used in this manual:



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

It may also be used to alert against unsafe practices.

IMPORTANT

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

NOTE

Draws attention to information essential for understanding the operation and features.

1.2 Warranty

FluidCom S2 is delivered with a warranty of one year from the factory.

If a defect for which Yokogawa is responsible occurs in the device during the warranty period, Yokogawa will repair that defect at its own cost.

If it is believed that the device is defective, please contact us and provide a detailed description of the problem including when the problem was first identified.

Please also inform us the model code and serial number of the device. Based on our test results, we will determine whether the device is to be repaired at Yokogawa's expense or at the expense of the customer.

1.3 Certification

FluidCom S2 is intended for operation in explosive atmospheres and is consequently certified according to certificate attached "EU-TYPE EXAMINATION CERTIFICATE".



CAUTION

General Ex compliance information and instructions for safe use is given in the Ex Instruction Manual found in the attached page.
Follow the instructions to ensure that installation and operation of FluidCom S2 always are according to the Ex requirements.

1.4 Abbreviations

AI	Analog Input
AO	Analog Output
ATEX	European directive for Ex environments
CCR	Central Control Room
DD	Device Descriptor
EMC	Electromagnetic Compatibility
FW	Firmware
GUI	Graphical User Interface
HART	Highway Addressable Remote Transducer
IECEx	International Electrotechnical Commission Explosive
IP	Ingress Protection
NON-IS	Non-Intrinsically Safe
MWP	Maximum Working Pressure
PE	Protective Earth
PV	Primary Variable
QV	Quaternary Variable
RCD	Residual Current Device
SV	Secondary Variable
TV	Tertiary Variable

1.5 Safety instructions (Instructions de sécurité)



WARNING

Maximum working pressure is 345 bar (5000 psi).
System where FluidCom is intended to be used must have an overpressure safety device, with a set point securing that FluidCom design pressure of 345 bar (5000 psi) not overseeded.
For design of overpressure safety device see Standard 61010 clause 11.7.4
La pression de service maximale est de 345 bar (5000 psi).
Le système dans lequel FluidCom est destiné à être utilisé doit avoir un dispositif de sécurité contre la surpression, avec un point de consigne garantissant que la pression de conception FluidCom de 345 bar (5000 psi) n'est pas sursemée.
Pour la conception du dispositif de sécurité contre les surpressions, voir la norme 61010 clause 11.7.4



WARNING

Electrical power supply shall be within 230 V AC 50/60 Hz.
L'alimentation électrique doit être comprise entre 230 V AC 50/60 Hz.



WARNING

Do not open when an explosive atmosphere is present.
Ne pas ouvrir en présence d'une atmosphère explosive.



WARNING

Do not open terminal cover in an explosive atmosphere when circuits are energized.
N'ouvrez pas le couvercle des terminaux, dans un atmosphère explosif lorsque les circuits sont sous tension.



WARNING

The terminal cover must be closed properly prior to energizing and power up FluidCom S2.
Assurez-vous de bien fermer les couvercle des terminaux avant la mise sous tension de FluidCom S2.



WARNING

Terminal no. 10 shall not be used as protective earth.
Le terminal no 10 ne doit pas être utilisé comme mise à la terre de protection.

**WARNING**

Do not perform start-up of FluidCom S2 before instrument tubing and all wiring are properly connected and the terminal cover is closed.
N'effectuez pas le démarrage de FluidCom S2 avant que la tubulure et tout le câblage soient correctement connectés et que le couvercle des borniers soit bien fermé.

**WARNING**

Do not start control system (system state = "running") without fluid in the system.
Ne démarrez pas le système de contrôle (état du système = « en cours d'exécution ») sans fluide dans le système.

**WARNING**

Do not perform any demounting work without properly isolating FluidCom S2 from pressurized fluid.
N'effectuez aucun travail de démontage sans isoler correctement FluidCom S2 du fluide sous pression.

**WARNING**

Do not perform any demounting work without de-energizing the power supply and isolating the signal loop's.
N'effectuez aucun travail de démontage sans mettre hors tension le bloc d'alimentation et isoler les boucles de signal.

**CAUTION**

FluidCom S2 should only be used with fluid parameters stored in the control system.
FluidCom S2 ne doit être utilisé qu'avec des fluides stockés dans le système de réglage.

**CAUTION**

FluidCom S2 control loop is NON-IS. keep awareness to this when e.g. using HART Field communicator.
La boucle de réglage FluidCom S2 n'est pas à sécurité intrinsèque. soyez attentif à cela lorsque, par exemple, vous utilisez un communicateur de terrain HART.

**CAUTION**

Enclosure to be opened by authorised personnel only.
Boîtier à ouvrir par personnel autorisé seulement.

**CAUTION**

Opening of enclosure should only be done by personnel authorized by manufacturer.
L'ouverture du boîtier ne doit être faite que par le personnel autorisé par le fabricant.

**CAUTION**

The support ring is not permitted as part of the FluidCom S2 assembly when installed in an explosive atmosphere.
La bague de support n'est pas autorisée dans le cadre de l'assemblage FluidCom S2 lorsqu'elle est installée dans un atmosphère explosif.

**CAUTION**

FluidCom S2 can only be installed in areas compliant with the FluidCom S2 ex protection.
FluidCom S2 ne peut être installé que dans des zones conformes à la protection FluidCom S2 ex.

**CAUTION**

The Fluidcom enclosure (chassis) must be connected to earth.
Le boîtier Fluidcom (châssis) doit être mis à la terre.

**CAUTION**

Installation of the product according to Chapter 4. Installation in an explosion protection environment should be done in accordance with IEC (EN) 60079-14.
Installation du produit conformément au chapitre 4. L'installation dans un environnement de protection contre les explosions doit être effectuée conformément à la norme IEC (EN) 60079-14.

IMPORTANT

This equipment must not be used in any other applications than intended.
Cet appareil ne doit pas être utilisé pour d'autres applications que celles prévues.

IMPORTANT

The FluidCom S2 230 VAC power supply must include a residual current device with a tripping current < 100 ma and a tripping time < 100 ms.
L'alimentation 230vac du FluidCom S2 doit avoir un dispositif de courant résiduel qui déclanche avec < 100 ma et un temps < 100 ms.

NOTE

For maintenance or repair, contact manufacturer for support. customer service details in section 1.3
Pour l'entretien ou la réparation, contactez le fabricant pour obtenir de l'aide. détails du service à la clientèle dans la section 1.3.

1.6 Intended use

IMPORTANT

FluidCom S2 is a product that is specifically designed to be installed and operate within large-scale fixed installations.

IMPORTANT

Directive 2011/65/EU does not apply to this product and is not part of the CE marking.

IMPORTANT

Consider the intended use and CE marking if the unit is installed for operation inside the European Economic Area.



WARNING

This product must not be used beyond the intended use.

How to dispose of the batteries:

This is an explanation about the EU Battery Directive. This directive is only valid in the EU.

Batteries are included in this product. Batteries incorporated into this product cannot be removed by yourself. Dispose of them together with this product.

Battery type: Lithium battery



Notice:

The symbol (see above) means they shall be sorted out and collected as ordained in the EU Battery Directive.

Product Disposal:

The instrument should be disposed of in accordance with local and national legislation/regulations.

2. Product overview

FluidCom S2 chemical injection flow controller includes technology for flow control. Once installed and put into operation, no planned regular maintenance or manual intervention is required.

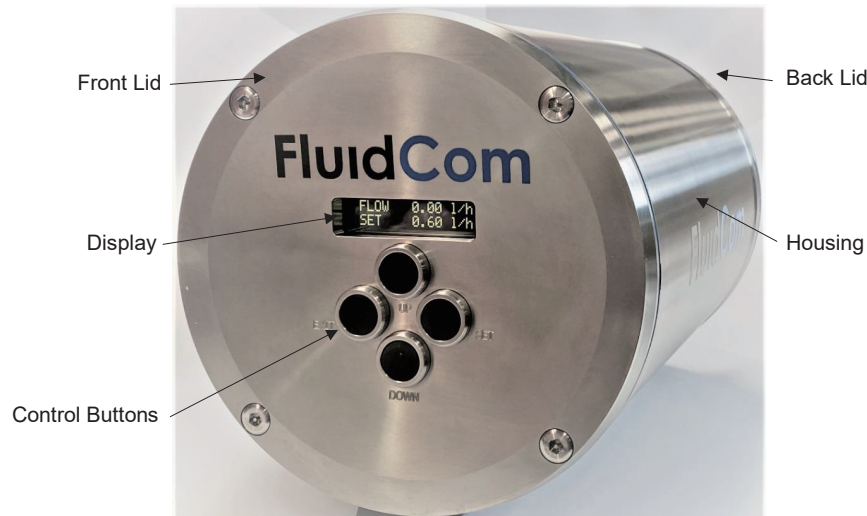


Figure 2.1 FluidCom S2 overview

2.1 Technical specifications

Table 2.1

TECHNICAL SPECIFICATION	DATA
Maximum working pressure (MWP)	345 bar [5000 psi]
Flow range	0.6 – 30.0 L/h (0.16 – 7.93 gal/h)
Ambient temperature range	–20°C to +55°C (–4°F to +131°F)
Dimensions	Ø219 mm x 353 mm, (Ø8.6" x 13.9")
Weight	17.5 kg (38.6 lbs)
Ingress protection (IP)	IP66
Electrical power supply	230 V AC 50/60 Hz
Power consumption (max)	100 W
Signal input	4-20 mA DC
Communication protocol	HART v.7.1

Note: Depending on the thermal property of chemicals, flow range can be expanded to 0.3 – 60 L/h (0.08 – 15.85 gal/h).

IMPORTANT

Flow ranges other than listed in Table 2.1 available upon request.

IMPORTANT

For Ex specifications, see Ex Instruction Manual (refer to the attached page).

2.2 Connection interfaces

Figure 2.2 presents the interfaces relevant for installation and connection of FluidCom S2.

FluidCom S2 is delivered without cable glands, but with blind plugs protecting the threaded hole. Suitable cable glands must be installed prior to use of FluidCom S2 (ref. section 6.8.1).

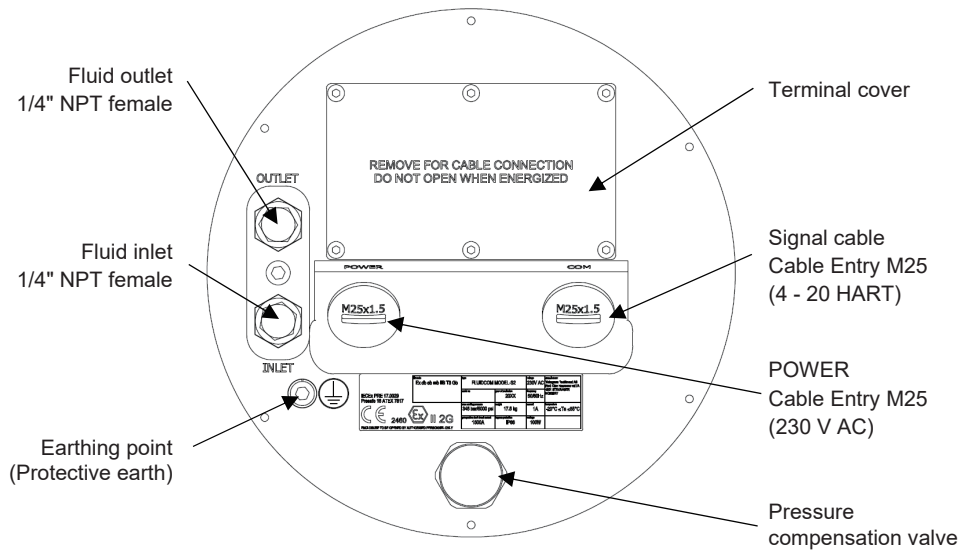


Figure 2.2 FluidCom S2 rear view w/connection interfaces

2.3 Display

Figure 2.3 shows the front view with the display for local operation of FluidCom S2. See section 3.5 for details regarding local operation.

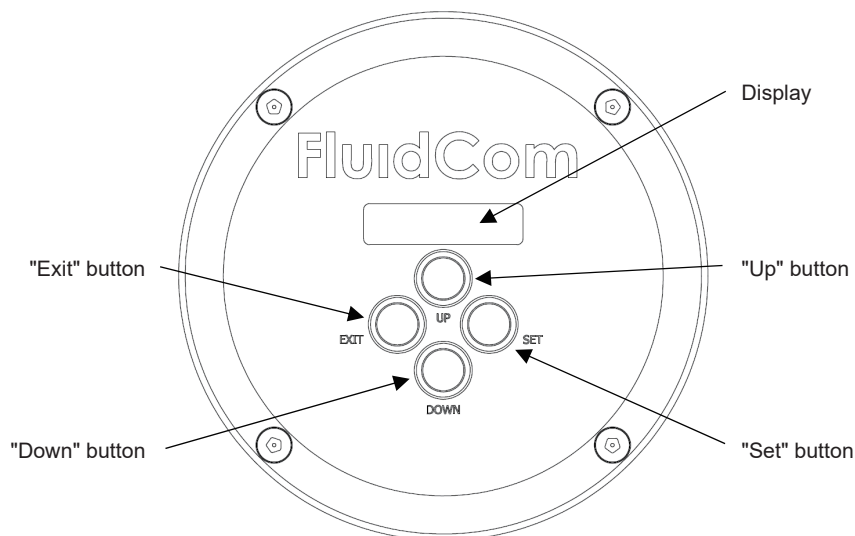


Figure 2.3 FluidCom S2 front view w/display

3. Operation

This section contains the information needed to safely operate FluidCom S2. Prior to operation, read the operational instructions given in the Ex Instruction Manual (the attached page) to ensure a safe operation.

IMPORTANT

The operational instructions given in the Ex Instruction Manual (the attached page) must be adhered to at all times.

Operation of FluidCom S2 is either remote by HART protocol by a 4-20 mA input loop, or local by use of the display. The HART communication protocol is HART v.7.1.

Communication between FluidCom S2 and the central control room (CCR) can be configured as single-point-to-point or multidrop. A multidrop configuration is available for up to eight units.

Other communication protocols than HART protocol can be used in remote operation if using a suitable protocol converter. Protocol conversion is available both in single-point-to-point and multidrop configurations.

Analog single-point-to-point communication is available by use of the 4-20 mA control loop, or by use of a HART-to-analog converter.

3.1 Device variables

This section presents FluidCom S2 device variables available as “read” or “read/write” variables. All variables are accessible in local operation, while limited access is available in remote operation. Table 3.1 gives an overview of the device variables.

Table 3.1

DEVICE VARIABLE	READ / WRITE	REMOTE	LOCAL
Flow rate	R	X	X
Set flow rate	R/W	X	X
Controller mode	R/W		X
System state	R/W		X
Manual mode setting	R/W		X
Resettable total	R/W		X
Cumulative total	R		X
Controller stage	R		X
Fluid temp. inlet	R	X	X
Fluid temp. outlet	R	X	X
Fluid temp. heater	R	X	X
Fluid type	R/W		X

3.1.1 Volumetric flow rate

The flow rate through the valve is continuously controlled by the control system. The flow rate can be presented in “L/h” or “kg/h” (display only). To change flow unit, see section 3.5.2.3.

The integrated flow control function measures the change in fluid temperature between the inlet temperature T_1 (°K) and the outlet temperature T_2 (°K) across a controlled heater providing energy I (J/s). Knowing the fluid heat capacity CP (J/g°K), the flow rate Q is calculated according to the following formula:

$$Q = \frac{I}{CP (T_2 - T_1)}$$

Instead of fluid CP value input, empirical calibration test parameters are used as input to flow formula during calibration.

NOTE

The flow reported in this device is only valid when a physical flow is present. This means if flow through the device is completely stopped (i.e., external valves isolated or pump stop), the device will still report a non-valid flow for a limited time as a result of the remaining heat energy ($T_2 - T_1$ left in the isolated fluid until this has reached thermal equilibrium.)

3.1.2 Set flow

Flow setting to be adjusted by user. This setting is only applicable when unit is in auto mode.

NOTE

When a new flow is set, FluidCom will automatically enter a mode for thermal stabilization for up to 15 minutes before returning to active flow measurement and controlling mode. Note that the device need some time after entering control mode until reaching the set flow, this might vary depending on flow rate and fluid properties.

NOTE

When in stabilization mode, the display will flash on “flow,” indicating flow rate measurement not yet active, and the same value as for “set flow” is shown.

NOTE

When in stabilization mode, the 4-20 mA flow output signal will show the same value as for “set flow.” HART status bit is available on this signal to identify if flow measurement is active.

3.1.3 Controller mode

Two controller modes are available in the FluidCom S2 system:

- “Auto mode” is the mode intended for normal operation. In this mode, the control system automatically regulates the flow according to the set flow.
- “Manual mode” is a mode intended for testing only. In this mode, the heater power is adjusted instead of the set flow (ref. section 3.1.5).
Note that the flow report is not valid in manual mode.

3.1.4 System state

This variable represents the state of the control system. This is also the “start” and “stop” control of the system. The system will be in one of the following states:

- “Stopped” – No regulation (no heater power), and consequently the valve is closed.
- “Running” – The system is active and regulates according to the flow setting.
- “Idle” – The default state when the system starts.
- “Warning” – System has stopped (unintentionally) and needs a power cycle or system reset in the service menu in the local control to restore functionality.

3.1.5 Manual mode setting

The applied heater power is adjusted in a range from 0-100%, where 100% is equivalent to 100 W.

3.1.6 Resettable total

Total volume of fluid through valve since last reset.

3.1.7 Cumulative total

Total volume of fluid through valve since first start-up of control system.

3.1.8 Controller stage

In auto mode, the system will be in one of the following regulation stages:

- “Evaluating” – Evaluating system status.
- “Standby” – Regulation on hold.
- “Controlling” – Normal regulation.
- “Stabilizing” – System in stabilization process when set flow is increased/decreased.

3.1.9 Inlet temperature

The measured value of the inlet temperature of the fluid.

3.1.10 Outlet temperature

The measured value of the outlet temperature of the fluid.

3.1.11 Heater temperature

The measured value of the temperature on heater surface. The control system is programmed to shut down the heater power if the heater temperature reaches 95°C (203°F).

3.1.12 Heater power

The measured value of the power of heater.

3.2 Fluid

Parameters for up to eight of fluids can be stored in the control system. This variable allows for selecting which of the eight fluids to operate.



CAUTION

Use the display and select the applicable fluid in the control system before running FluidCom S2. See the test protocol for installed fluids, or contact manufacturer (refer to serial no. of unit).

3.2.1 Compatible fluids

All Fluids intended to be used with FluidCom needs following validation:

- Validate that each fluid intended to be used is compatible with FluidCom wetted part materials. Check against SDS for the actual chemical
- To secure accurate flow metering, each fluid intended to be used with FluidCom needs to be characterised using FluidCom test Facility. Actual characteristics needs to be uploaded to FluidCom before use.
Upload can be performed at factory or at site depending on when fluid characteristics are made available.

3.2.2 Change of fluids used

IMPORTANT

If there occur need for changing type of fluid running through the FluidCom, some checks must be done.

- Do FluidCom have the calibration data for the new fluid installed?
- Is the new fluid compatible to be mixed with the old one?
Check SDS for the actual chemicals.

If the new fluid is not compatible to be mixed with old one, the process described in section 8.1. This process must be performed several times, depending on the properties to the fluids and what fluids they are compatible.



CAUTION

FluidCom S2 should only be used with the fluid(s) which calibration data has not been stored in it.

IMPORTANT

If FluidCom S2 is intended to be used with a fluid which calibration data is not stored in it, calibration data of that fluid must be loaded into the FluidCom S2 beforehand. Please contact customer service.

3.3 Remote operation by HART

FluidCom S2 comprises a 4-20 mA output loop interface with HART v.7.1 communication protocol. The HART device variables made available for remote operation of FluidCom S2 are presented in section 3.3.1.

- The regulation mode must be in auto mode for the use of HART protocol. Changing of regulation mode is not possible by HART commands.
- Remote flow reading is only available in auto mode.
- If flow rate is set to 0.0 L/h by HART command, system state is automatically changed to “stopped”. A flow rate setting > 0.0 L/h by HART command automatically changes the system state to “running”.

IMPORTANT

If setting a flow > 0.0 L/h by HART command, also when in manual mode, system state will change to “running.”

IMPORTANT

Always change regulation mode back to auto mode after operation in manual mode.

Figure 3.1 shows the graphical user interface (GUI) for remote operation by HART protocol.

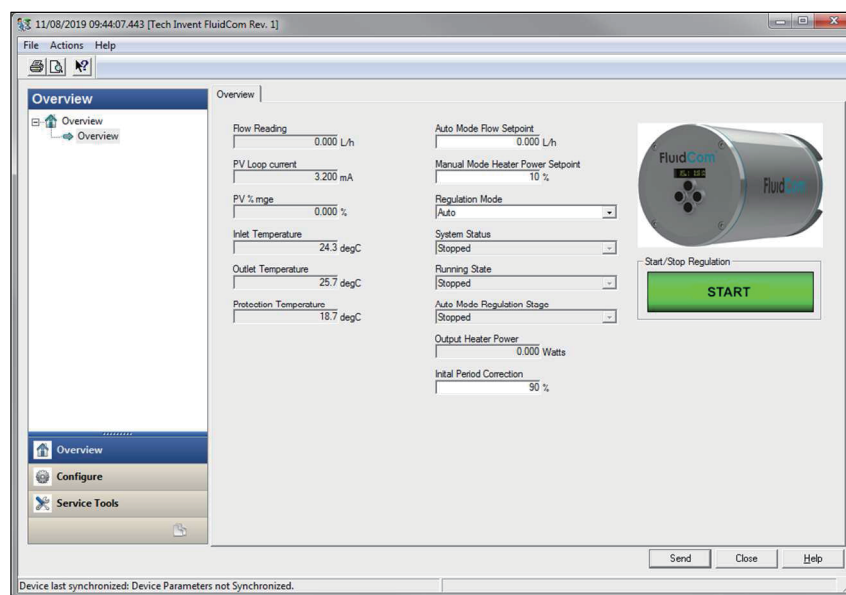


Figure 3.1 GUI for remote operation by HART protocol

3.3.1 HART device variables

Table 3.2 presents the device variables made available for operation by HART protocol.

Table 3.2 presents the device variables made available for operation by HART protocol.

#	DESCR.	DYN. VARIABLE / PARAMETER	READ / WRITE	NOTES	VERSION							
					DISPLAY		MAIN			DD		
					2.0.7	2.0.8	2.0.9	2.0.7	2.0.8	2.0.9	1.30	1.40
1	Flow	PV	R	"Flow Reading" in GUI	■	■	■	■	■	■	■	■
2	Temp. inlet	SV	R		■	■	■	■	■	■	■	■
3	Temp. outlet	TV	R		■	■	■	■	■	■	■	■
4	Temp. heater	QV	R	"Protection Temp." in GUI	■	■	■	■	■	■	■	■
5	Set flow	Flow setting	R/W	"Flow Setting" in GUI = 0.0 L/h → system state STOPPED > 0.0 L/h → system state RUNNING	■	■	■	■	■	■	■	■
-	Power	Heater Power	R/W	Manual mode setpoint	□	■	■	□	■	■	■	■
-	-	Regulation Mode	R/W		□	■	■	□	■	■	■	■
-	-	System Status	R		□	■	■	□	■	■	■	■
-	-	Running State	R/W		□	■	■	□	■	■	■	■
-	-	Auto Mode Regulation Stage	R		□	■	■	□	■	■	■	■
-	Level	Accumulated Flow (Non-resettable)	R		□	■	■	□	■	■	■	■
-	Level	Accumulated Flow (Resettable)	R	Can be cleared only	□	■	■	□	■	■	■	■
-	Power	Output Heater Power	R		□	■	■	□	■	■	■	■
-	-	Initial Period Correction	R/W		□	■	■	□	■	■	■	■
-	-	Selected Fluid	R/W	Select one of eight stored fluids	□	■	■	□	■	■	■	■
-	-	Fluid Parameters	R/W	Change calibration parameters	□	■	■	□	■	■	■	■
-	-	Analog Input Configuration	R/W	Disable/Enable/Select analog input function.	□	□	■	□	□	■	□	■

NOTE

Primary variable 4-20 mA on HART loop analog output is "Flow Reading."

NOTE

System state "stopped" gives 3.2 mA readout.
System state "warning" gives 22.8 mA readout.

3.3.2 Multidrop

FluidCom S2 can be configured for multidrop communication by HART protocol. Maximum number of FluidCom S2 which can be connected to multidrop is eight units a loop. For information regarding HART polling addresses, see section 5.3.2.

3.3.3 Protocol conversion

Both point-to-point configuration and multidrop configuration, FluidCom S2 can be operated by other communication protocols (e.g. Profibus, Modbus, etc.) using protocol converters. See more details in section 4.9.4.

3.3.4 Analog output

Analog control (4-20 mA) is possible on single-point-to-point configured FluidCom S2 units when using the HART communication protocol. To achieve this, a suitable HART-to-analog converter must be applied. See more details in section 4.9.4.2.

3.4 Analog input (4-20 mA) for remote flow set

FluidCom S2 comprises a separate 4-20 mA AI control loop interface in addition to the HART control loop. This is a separate connection and provides an operation for analog remote setting. See more details in section 4.8.4.3

IMPORTANT

In this configuration the analog flow set will be performed from a remote location. Local flow set from push buttons on the front panel or HART loop is not possible.

- The analog set input can be used in auto mode (zero – max flow L/h) or manual mode (0-100%). Change of regulation mode (auto/manual) is not possible via the control loop and must be changed using the local display.
- Flow reading is only available on the standard analog output loop.
- If flow is set to 0.0 L/h by applying 4 mA current, system state is automatically changed to “stopped”. A flow setting > 0.0 L/h by applying > 4 mA current automatically changes the system state to “running.”

IMPORTANT

If setting a flow > 0.0 L/h by a 4-20 mA control loop command, also when in manual mode, system state will change to “running.”

IMPORTANT

Always change the regulation mode back to auto mode after operation in manual mode.

3.5 Local operation

Display and control buttons in front of FluidCom S2 are used for local operation.

- The default view in the display is dependent on in which control mode the system is running.
- The display will automatically return to the default view if push buttons are left untouched for more than 12 seconds.
- UP and DOWN buttons are used to navigate in the menu, and to change/adjust a writeable device variable.
- Push SET button to open for changing/adjusting writeable variables. LCD will start blinking. Push SET button again to confirm the change/adjustment.
- When a variable is open for change/adjustment, the display is blinking. The blinking will continue until SET button is used to confirm (no automatic return to default view).
- If entered the set flow adjustment (auto mode) or set power adjustment (manual mode), the EXIT button can be used to return to the default view without applying any new settings.

Display menu flowchart is found in section 3.5.1 and 3.5.2.

These flowchart can be sent as high resolution pdf-file upon request.

3.5.1 Display main menu flowchart

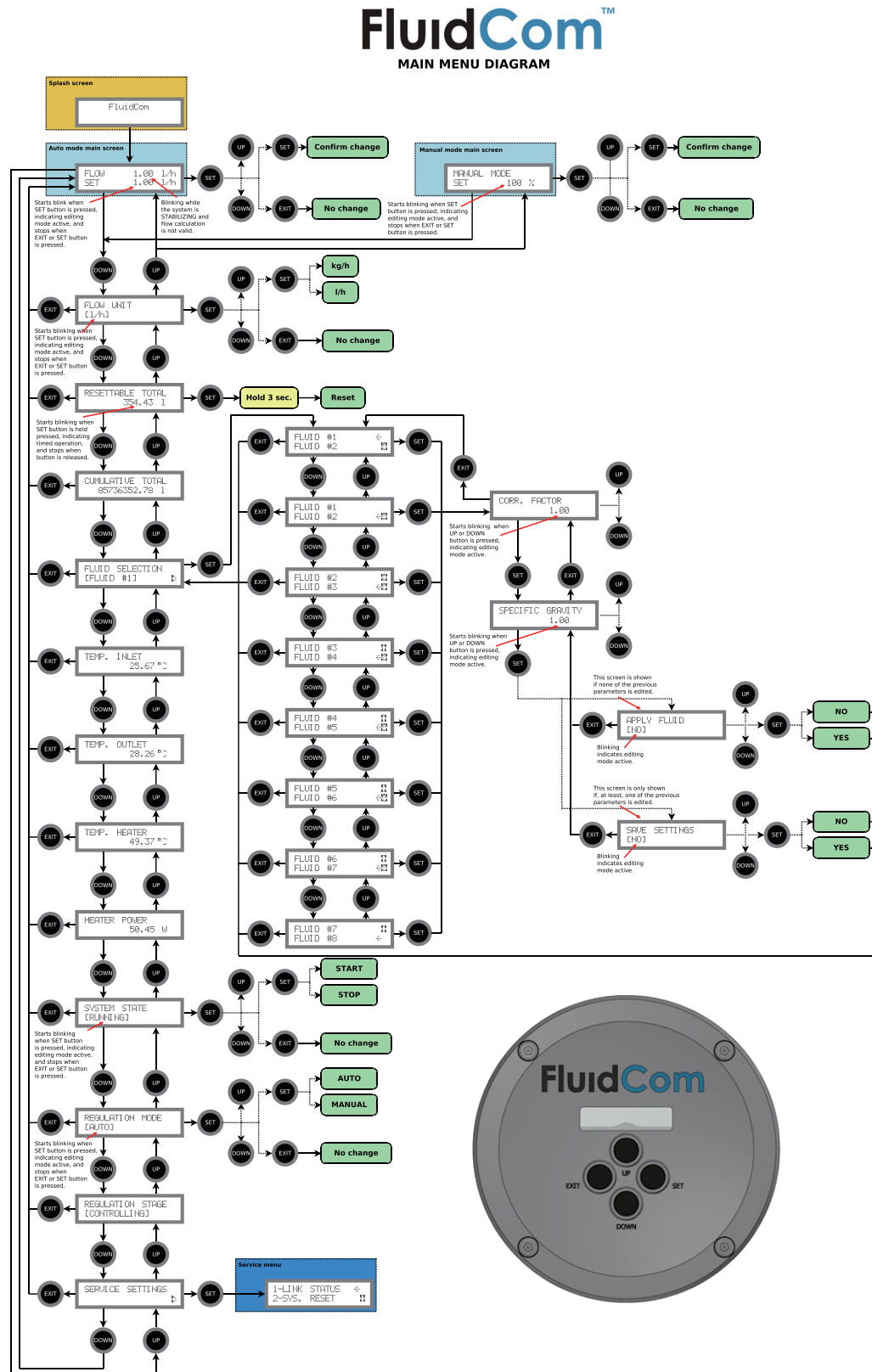


Figure 3.2 Display main menu flowchart

3.5.2 Display service menu flowchart

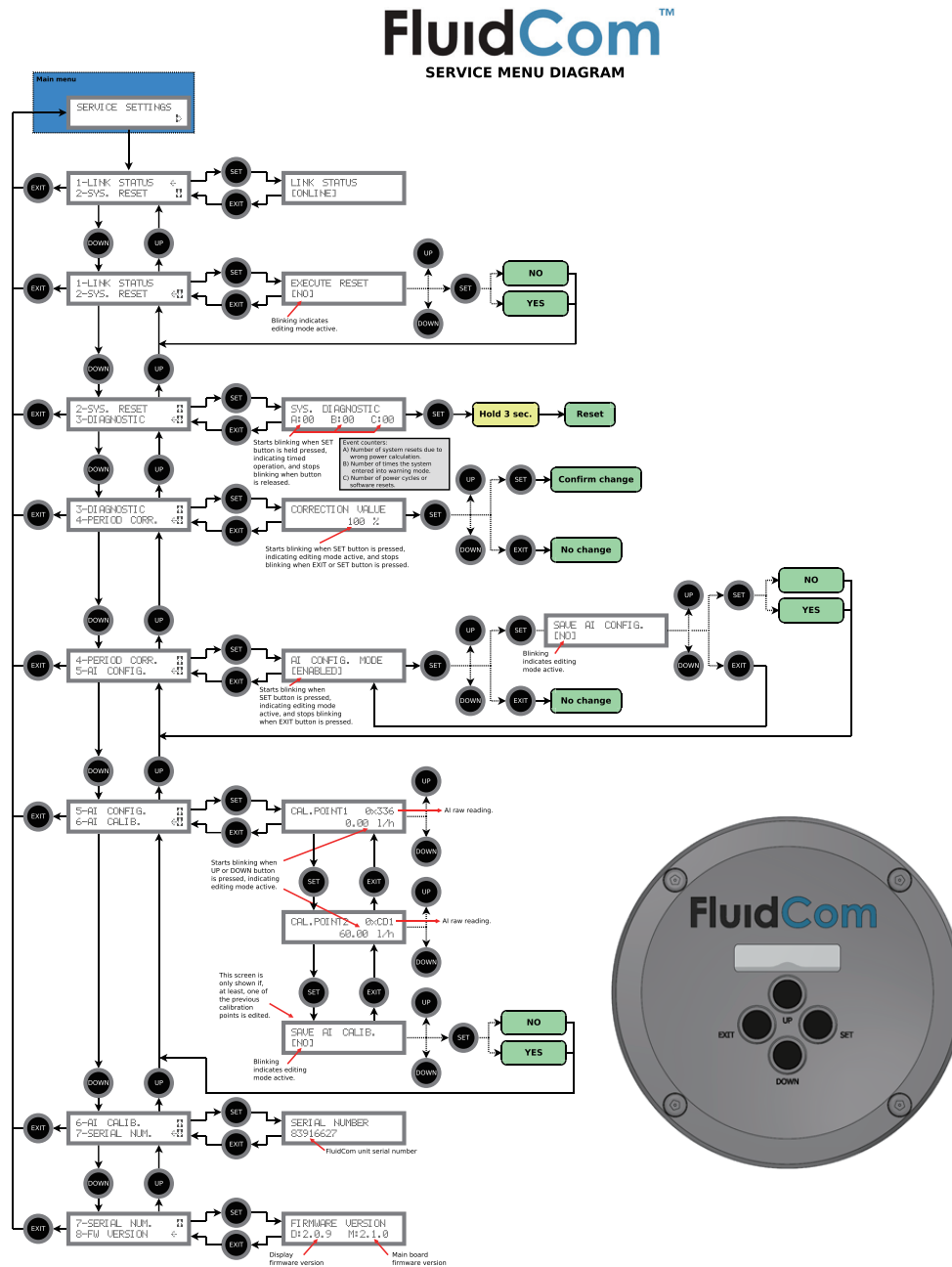


Figure 3.3 Display service menu flowchart

3.5.3 Display operations

3.5.3.1 Start and stop system

From “system state” view:

- SET (to open for changing the system state)
- UP (to select “start”)
- DOWN (to select “stop”)
- SET (to confirm the system state)

3.5.3.2 Set flow rate

From auto mode default view:

- SET (to open for adjusting the set flow)
- UP/DOWN (to adjust set flow; hold button for continuous counting)
- SET (to confirm the set flow)
- EXIT (to return to default view without new settings)

3.5.3.3 Change flow unit

NOTE

To use “kg/h” it is required that the correct specific gravity of the fluid is stored in control system. See section 3.5.3.4. This is a display option only and changing units will have no effect on flow reading on the HART loop.

From “flow unit” view:

- SET (to open for changing the flow unit)
- UP (to select “kg/h”)
- DOWN (to select “l/h”)
- SET (to confirm the flow unit)

3.5.3.4 Change fluid parameters

NOTE

From “fluid selection” it is only possible to either change which fluid to operate, or to change the fluid parameters.

NOTE

To apply the changed parameters and use the applicable fluid, perform the “change fluid” operation according to section 3.5.3.5.
Thereafter set flow according to section 3.5.3.2.

From “fluid selection” view:

SET (to open for selecting on which fluid to change parameters)

UP/DOWN (to change to applicable fluid)

SET (to continue to “correction factor” view)

From “correction factor” view:

UP/DOWN (to adjust the correction factor; > 1.00 flow decrease; < 1.00 flow increase)

SET (to continue to “specific gravity” view)

From “specific gravity” view:

UP/DOWN (to adjust the specific gravity)

SET (to continue to “save settings” view)

From “save settings” view:

UP (to select “yes”)

DOWN (to select “no”)

SET (to save new settings)

3.5.3.5 Change fluid type

NOTE

From “fluid selection” it is only possible to either change which fluid to operate, or to change the fluid parameters.

From “fluid selection” view:

SET (to open for selecting the fluid)

UP/DOWN (to change to applicable fluid)

SET (to continue to “correction factor” view)

From “correction factor” view:

SET (to continue to “specific gravity” view)

From “specific gravity” view:

SET (to continue to “apply fluid” view)

From “apply fluid” view:

UP (to select “yes”)

DOWN (to select “no”)

SET (to apply new fluid)

3.5.3.6 Change regulation mode

NOTE

To change regulation mode, the system state must be “stopped.” If required to stop the system, see section 3.5.3.1.

From “regulation mode” view:

- SET (to open for changing the regulation mode)
- UP (to select “auto”)
- DOWN (to select “manual”)
- SET (to confirm the regulation mode)

IMPORTANT

Always change regulation mode back to auto mode after operation in manual mode.

3.5.3.7 Set adjust heater power (manual mode setting)

From manual mode default view:

- SET (to open for adjusting the heater power)
- UP/DOWN (to adjust heater power; hold button for continuous counting)
- SET (to confirm the heater power)
- EXIT (to return to default view without new settings)

3.5.3.8 Totalizer reset

From “resettable total” view:

- SET [3 sec.] (to reset the resettable total back to 0 litres)

3.5.3.9 Service settings (authorized service personnel only)

IMPORTANT

Only authorized service personnel is allowed to enter and adjust the service settings.

NOTE

“AI CONFIG.” – This function is only available from display FW version 2.0.9, released 01.01.2020.

NOTE

“AI CALIB.” – In display FW version older than version 2.0.9 this function is called “ILOOP CALIB.”

LINK STATUS

Communication status with main board.

OFFLINE
ONLINE

SYS.RESET

Soft power recycles.

DIAGNOSTIC

Event counters.

A = No. of power fault detections (0 W) leading to a system reset.

B = No. of system state "warning" detections.

C = No. of power cycle and software reset detections.

PERIODE CORR.

Adjust initial period table percentage 50-150 %.

AI CONFIG.

Disable or enable to set flow by use of 4-20mA loop.

From AI CONFIG. view:

SET (to open for changing this)

UP/DOWN (to change from disabled (default setting) to enable set flow)

SET (to confirm new setting)

AI CALIB.

Calibrate range for optional analog flow set channel.

From AI CALIB. view:

SET (to open for adjusting calibration point 1)

From CALIB. POINT1 view:

Apply 4 mA from external flow set.

UP/DOWN (adjust flow 0.1 L/h to 0.0 L/h, display flashing, wait until calibration factor is stable within ± 1 digit)

SET (to confirm and continue to CALIB. POINT2 view)

From CALIB. POINT2 view:

Apply 16 mA from external flow set.

UP/DOWN (adjust flow 75 % of max flow range, display flashing, wait until calibration factor is stable within ± 1 digit)

SET (to confirm and continue to SAVE CALIBRATION view)

From SAVE CALIBRATION view:

SET (to confirm "yes" and save calibration)

SERIAL NUM.

Show serial number.

FW-VERSION

Show firmware version of display and main board.

3.6 HART Field Communicator

NOTE

Make sure the FluidCom S2 DD for HART Field Communicator is installed.

For wiring and connection of the HART Field Communicator, see section 4.9. For information regarding DD for HART Field Communicator, see section 5.3.1.

The HART Field Communicator will automatically detect FluidCom S2 as a device. The warning message shown in Figure 3.4 appears when selecting the device. Select “CONT” to continue.

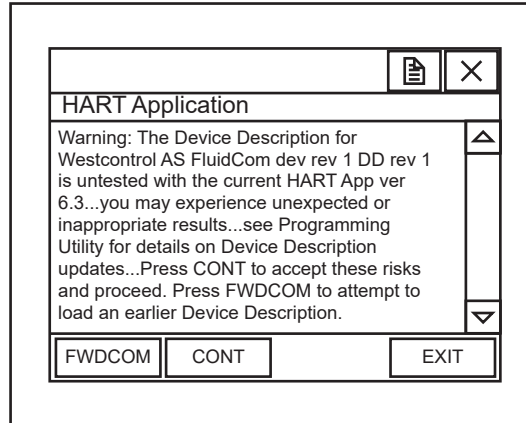


Figure 3.4 Device selection warning message

Figure 3.5 shows the main menu for FluidCom S2. Select “1 Overview” to enter the device variables overview page.

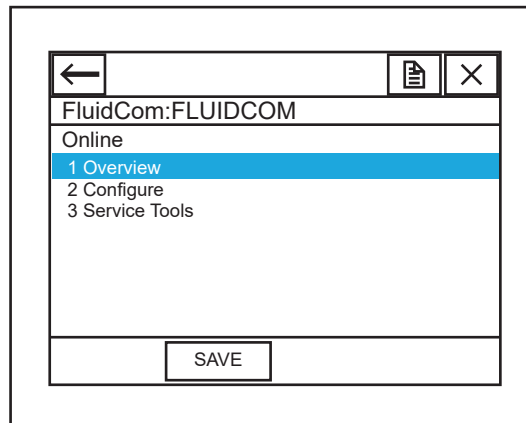


Figure 3.5 HART Field Communicator main menu for FluidCom S2

Figure 3.6 shows the overview of all FluidCom S2 device variables made available for HART protocol (ref. section 3.3.1). To change flow setting, select “7 Flow Setting”.

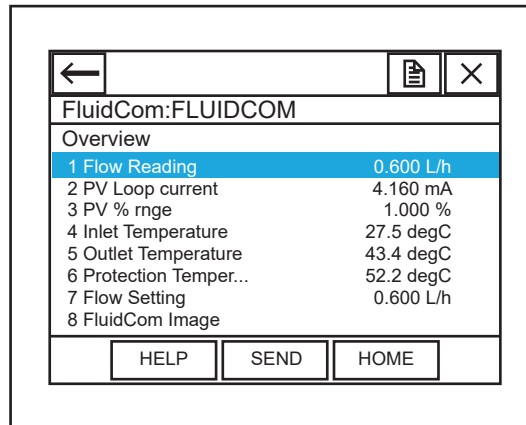


Figure 3.6 Device variables overview

Figure 3.7 shows the flow setting page on the HART Field Communicator. Type in the flow setting and select “ENTER.”

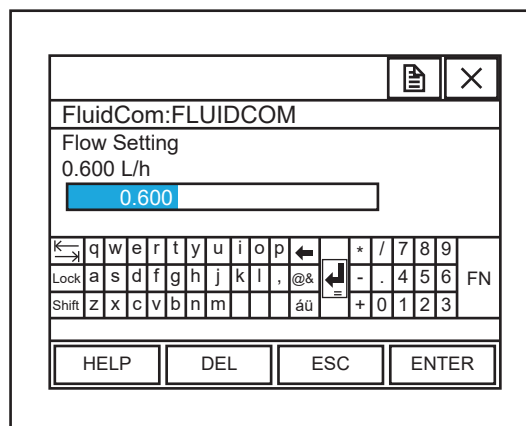


Figure 3.7 HART Field Communicator flow setting

Confirm that the setting values you entered are displayed in the Flow Setting, and then select “SEND”.

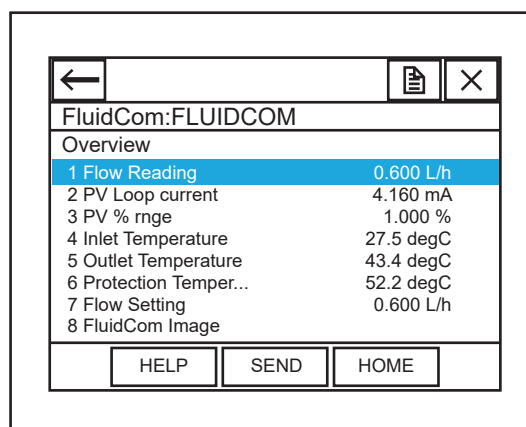


Figure 3.8 Device variables overview

4. Installation

This section provides the installation instructions for the FluidCom S2. In addition to the following instructions, it is required to adhere to the instructions given in the Ex Instruction Manual found in section 11.

IMPORTANT

To comply with the Ex requirements, the installation instructions given in the Ex Instruction Manual (section 11) must be followed.

Installation shall comply with local installation requirements and local electrical codes.

4.1 Tools needed

- Wrench – Suitable for the fittings/tubing size that is used.
- Standard hand tools – Screwdrivers, allen key, adjustable spanner, pipe set in mm, etc
- Torque puller – For use on the terminal blocks (See chapter 4.9)

4.2 Unpacking and preparation

- Unpack the FluidCom S2 and check for any outside damages to the equipment.

4.3 Installation site



CAUTION

FluidCom S2 can only be installed in areas compliant with the FluidCom S2 Ex protection.

Consider the following conditions for the installation site:

- Verify the FluidCom S2 is installed in areas compliant to the requirements given in the Ex Instruction Manual (section 11).
- Easy access to the display and push buttons (local operation).
- Ensure that the installations that can carry the weight of the FluidCom units(s).
- Ensure minimum vibration is present in installation.

4.4 Installation positions

NOTE

Design and type of support for installation must be in accordance with international and/or national standards.

Consider the following when mounting of the FluidCom S2 unit:

- It is advised to use purpose made mounting brackets for installation. (Contact manufacturer or customer service for support.)
- The FluidCom S2 can be installed with any orientation.

4.5 Installation instructions

The following instructions for installation must be observed:

- To prevent fluctuations in pressure to FluidCom S2, make sure an appropriate pulsation dampener is installed.

4.6 Tubing connection

The FluidCom S2 must be connected to the instrument tubing following the normative standards for tubing installation applicable in the installation site.

The FluidCom S2 features bulkhead connectors with 1/4" NPT female as connection interface. When connecting the valve to the instrument tubing:

- Ensure the tubing is properly connected using sound engineering practice.
- Ensure the tubing do not exert excessive forces on the FluidCom S2.
- Ensure the tubing is correctly routed with reference to section 2.2 and Figure 2.2.

IMPORTANT

When connecting the fluid ports, ensure cleanliness. No contaminants or particles must enter the FluidCom S2 piping system.
Before disconnecting the tubes or ports, read SDS to ensure the safe handling of the chemical.

4.7 Earthing



CAUTION

The FluidCom S2 enclosure (chassis) must be connected to earth.

NOTE

Bounding cable cross-sectional area shall be minimum 4 mm² copper wire.

External earth ground point for supplementary bonding connection is located at the rear end of the FluidCom S2 unit (ref. section 2.2). A cable lug must be used on the bounding cable. Bounding cable must have a minimum 4 mm² copper wire cross-sectional area. This connection shall be used where local codes or authorities permit or require such connection.

- Unscrew the M6 hexagon socket head bolt and install the earthing cable lug between the two plain washers. Tighten the bolt with 5 Nm torque.

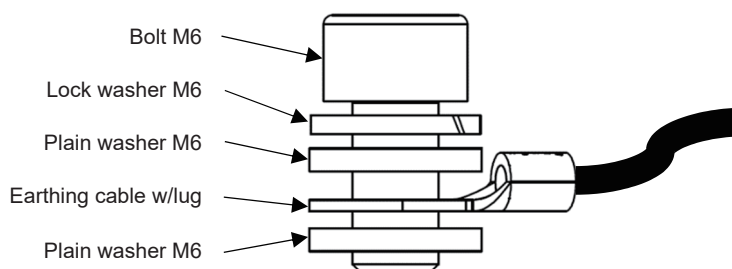


Figure 4.1 Fastening of earth ground cable

The equipment grounding connection (PE) shall be connected to the internal grounding terminal (ref. table 4.1 and figure 4.3).

4.8 Power distribution boards

Power distribution boards are normally provided by the customer. Figure 4.2 shows an example of an AC power distribution board. The power distribution is branched to each unit by a two-pole switch alternative a circuit breaker.

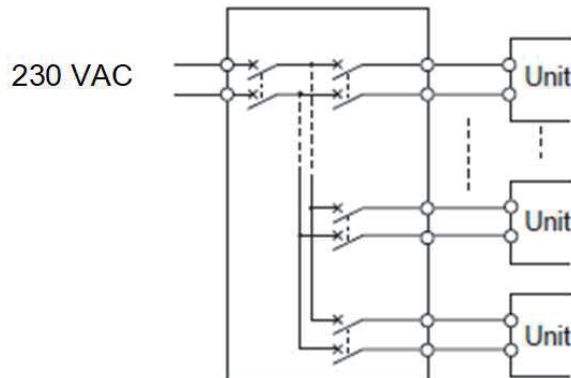


Figure 4.2 AC Power Distribution Board

4.9 Wiring

The terminals for connection of all external conductors are located inside the FluidCom S2 enclosure. Access to terminals is achieved by removing the terminal cover in rear end of enclosure (ref. section 2.2).

Conductor size can be between 0.75 – 2,5 mm² (18 – 14 AWG).

Tighten terminals using 0.5-0.6 Nm torque.



WARNING

Do not open terminal cover atmosphere when circuits are energized.



WARNING

The terminal cover must be closed properly prior to energizing and power up FluidCom S2.

Follow the guidelines given in the Ex Instruction Manual (the attached page) regarding electrical wiring.

The FluidCom S2 4-20 mA wiring can be done in various ways depending on the type of communication. See section 4.8.4.

4.9.1 Cable glands

FluidCom S2 is delivered without cable glands. Cable gland entry is M25 x 1,5. The cable glands to be installed should meet following requirements:

- Europa: ATEX and IECEx certified
- US/Canada: UL/CSA certified
- Russia: EAC certified
- Brazil: INMETRO certified
- Ingress protection minimum IP66.
- Preferred providing PE contact for the cable armour/braiding.



WARNING

Cable glands shall not compromise the FluidCom S2 Ex protection.

NOTE

Cable must be clamped and cleated effectively before entering cable gland. Design and type of cable gland for use in the various certification areas must be in accordance with international and national standards. Non-armored cable glands can be used. If so, use PE-terminal for PE in the power cable. The M4 earth ground point for PE shall be used for the signal cable (see Figure 4.3).

4.9.2 Terminals overview

An overview of terminals for connection of external wires is presented in Table 4.1. Use Figure 4.3 as reference.

Table 4.1

TERMINAL NO.	CONDUCTOR	APPLICATION
(1)	GND	Not in use
(2)	RELAY_LOAD_PTH	
(L1)	PHASE	Power connection
(PE)	EARTH	
(N)	NEUTRAL	
(6)	4-20 mA HART_LOOP (+) signal output	Bi-directional HART Analog flow read
(7)	4-20 mA HART_LOOP (-) signal output	
(8)	HART_+24 V out	
(9)	HART_GND (0 V)	
(10)	HART_EARTH	
(11)	ANALOG_4-20 mA (-) signal input	Analog flow set
(12)	ANALOG_4-20 mA (+) signal input	
(25)	Programming (service personnel only)	
(26)		

Terminals 8-10 only to be used in “multidrop operation by wireless HART” (see section 4.8.4.6).



Maximum permitted conductor size in terminals is 2.5 mm² (14 AWG).

NOTE

IMPORTANT

The general guidelines for wiring of the power supply are:

- Use a 3 G 2.5 mm² (14 AWG) cable (RFOU or similar).
- Use the left-hand side cable gland as entry for the power cable (ref. Figure 4.3).
- Use cable glands for armoured cables (Ex d) and tighten the cable gland properly to ensure the cable armour is in contact with earth (PE).
- Apply a cable ferrule on each conductor.
- Connect the conductors to terminals L1, PE and N.
- Ensure the power supply includes an RCD with a tripping current < 100 mA (30 mA preferred) and a tripping time < 100 ms.

4.9.4 Wiring of signal/control cable

NOTE

Use armoured cable for the signal/control loop.

For ATEX/IECEX areas it is required with minimum wire size of 0.75 mm² (18 AWG) for signal/control cable.

For other certification areas type of cable must be in accordance with relevant national and international standards.

IMPORTANT

A resistance of 250 Ω is required in the control loop to achieve communication.

The general guidelines for wiring of the signal/control loop are:

- Use a 1-pair or 2-pair cable with screen, collective or individual (RFOU or similar).
- Use right hand side cable gland as entry for the signal/control cable (ref. Figure 4.3).
- Apply cable ferrule on each conductor.
- Connect conductors to terminals no. 6-7 (and 11-12 if applicable).
- If the cable provides a screen in addition to the armour, let the screen be floating in FluidCom S2 end.
- Cable armour to be connected to earthing point M4 (ref. Figure 4.3).
- Use a loop resistance of 250 Ω located in the CCR (safe zone) to achieve communication.
- Tighten the cable gland properly to ensure the cable armour is in contact with earth (PE).

IMPORTANT

Terminal no. 9 and 10 shall **not** be used as protective earth.

FluidCom S2 can be configured both as a single-point-to-point unit and a multidrop unit.

Section 4.9.4.1 to 4.9.4.6 presents an overview of how to wire the different configurations.

- Section 4.9.4.1: Single-point-to-point operation by HART
- Section 4.9.4.2: Single-point-to-point operation by conversion of HART
- Section 4.9.4.3: Single-point-to-point operation by 4-20 mA (optional)
- Section 4.9.4.4: Multidrop operation by HART
- Section 4.9.4.5: Multidrop operation by conversion of HART
- Section 4.9.4.6: Multidrop operation by wireless HART

4.9.4.1 Single-point-to-point operation by HART

Figure 4.4 shows the wiring for the FluidCom S2 configuration providing single-point-to-point operation by HART protocol.

NOTE

FluidCom S2 is “passive” so the control loop must be powered from CCR.

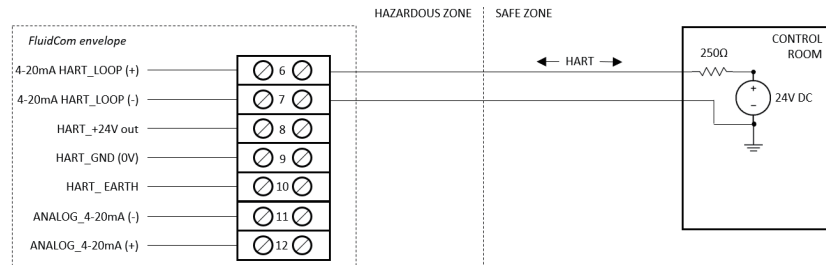


Figure 4.4 Single-point-to-point operation by HART protocol

4.9.4.2 Single-point-to-point operation by conversion of HART

Figure 4.5 shows the wiring for the FluidCom S2 configuration providing single-point-to-point operation by a bidirectional conversion of the HART protocol signals to either 4-20 mA analog signals or another type of communication protocol.

For analog control, a HART-to-analog converter is required. From CCR the analog input signal (AI) writes the set flow, and the analog output signal (AO) reads the flow. For operation by other communication protocols such as Profibus, Modbus, etc., a suitable communication protocol converter is required.

Any converter must be programmed to interface the FluidCom S2 HART protocol.

Information needed to perform such programming is provided as required by manufacturer.

NOTE

FluidCom S2 is “passive” so the control loop must be powered from CCR.

NOTE

Manufacturer provides the needed information for programming of the converters.

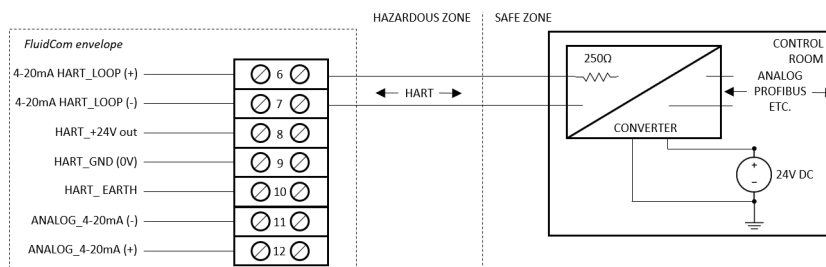


Figure 4.5 Single-point-to-point operation by conversion of HART to analog signal or another communication protocol

4.9.4.3 (Optional) Single-point-to-point operation by 4-20 mA

Figure 4.6 shows the wiring for the FluidCom S2 configuration providing single-point-to-point operation by 4-20 mA analog signals. The 4-20 mA signals, which are connected to terminal no. 11 and 12, allows for controlling the set flow. A 4 mA current (signal) will be read as “Min. Flow”, and a 20 mA current will be read as “Max Flow”.

Flow”, and a 20 mA current will be read as “Max Flow”.

This 4-20 mA control cannot be used for flow reading. The separate HART loop communication can still be used simultaneously to read flow (as well as other parameters available with HART). The set flow is always shown in the FluidCom S2 display.

NOTE

FluidCom S2 is “passive” so the control loop must be powered from CCR.

NOTE

Analog outputs (AO) on CCR side (PLC / RIO) must have separated channels. If AO cards don't have separated channels, isolators must be installed.

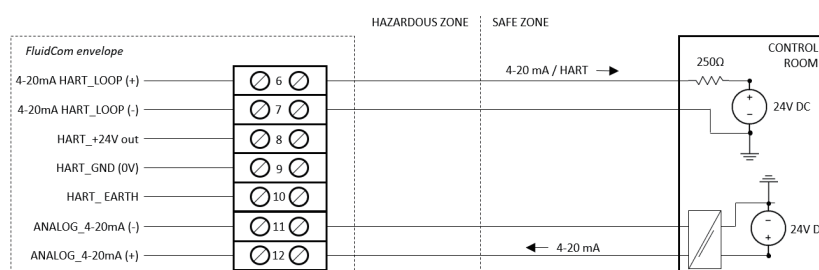


Figure 4.6 Single-point-to-point operation by 4-20 mA analog signal

Analog setting for using the control loops for flow read and flow set is shown in respectively Table 4.2 and Table 4.3.

Table 4.2

ANALOG OUTPUT	FLOW READ
22.8 mA	Fault
20.0 mA	Max flow (default control loop config. = 70 L/h)
4.0 mA	Min. flow (default control loop config. = 0 L/h)
3.2 mA	Stopped

Table 4.3

ANALOG INPUT	FLOW SET
20 mA	Max flow (default control loop config. = 70 L/h)
4 mA	Min. flow (default control loop config. = 0 L/h) Set system state to “stopped”

NOTE

The actual min. and max flows achievable are dependent on the thermal properties of the fluid and will consequently be defined as part of the flow calibration variables stored in the control system for each fluid.

NOTE

Flow range can be changed by use of HART-configuration.

4.9.4.4 Multidrop operation by HART

Figure 4.7 shows the wiring for the FluidCom S2 configuration providing multidrop operation by HART protocol. The maximum number of FluidCom S2 units per control loop is eight.

Information about HART polling addresses is found in section 5.3.2.

NOTE

FluidCom S2 is “passive” so the control loop must be powered from CCR.

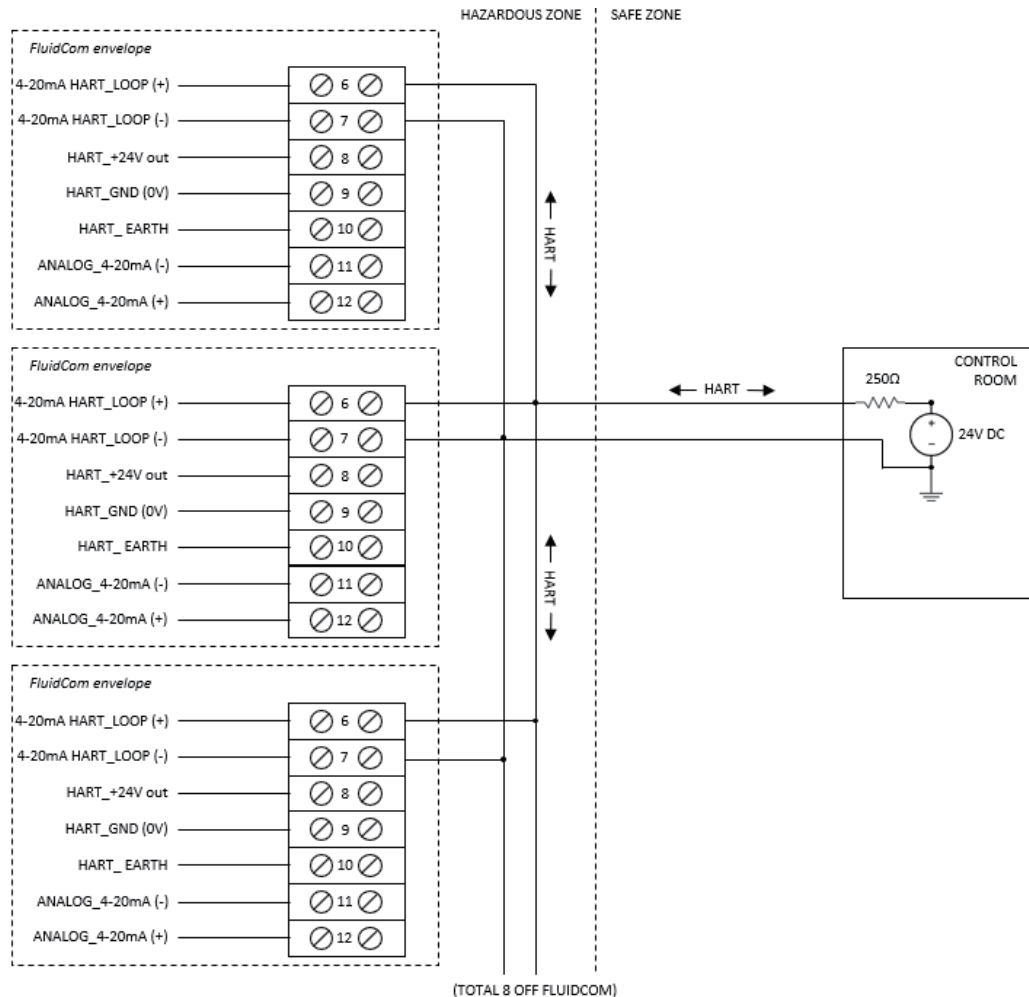


Figure 4.7 Multidrop operation by HART protocol

4.9.4.5 Multidrop operation by conversion of HART

Figure 4.8 shows the wiring for the FluidCom S2 configuration providing multidrop operation by a bidirectional conversion of the HART protocol signals to another type of communication protocol. The maximum number of FluidCom S2 units per control loop is eight. Information about HART polling addresses is found in section 5.3.2.

For operation by other communication protocols such as Profibus, Modbus, etc., a suitable communication protocol converter is required. Any converter must be programmed to interface the FluidCom S2 HART protocol. Information needed to perform such programming is provided as required by manufacturer.

NOTE

FluidCom S2 is “passive” so the control loop must be powered from CCR.

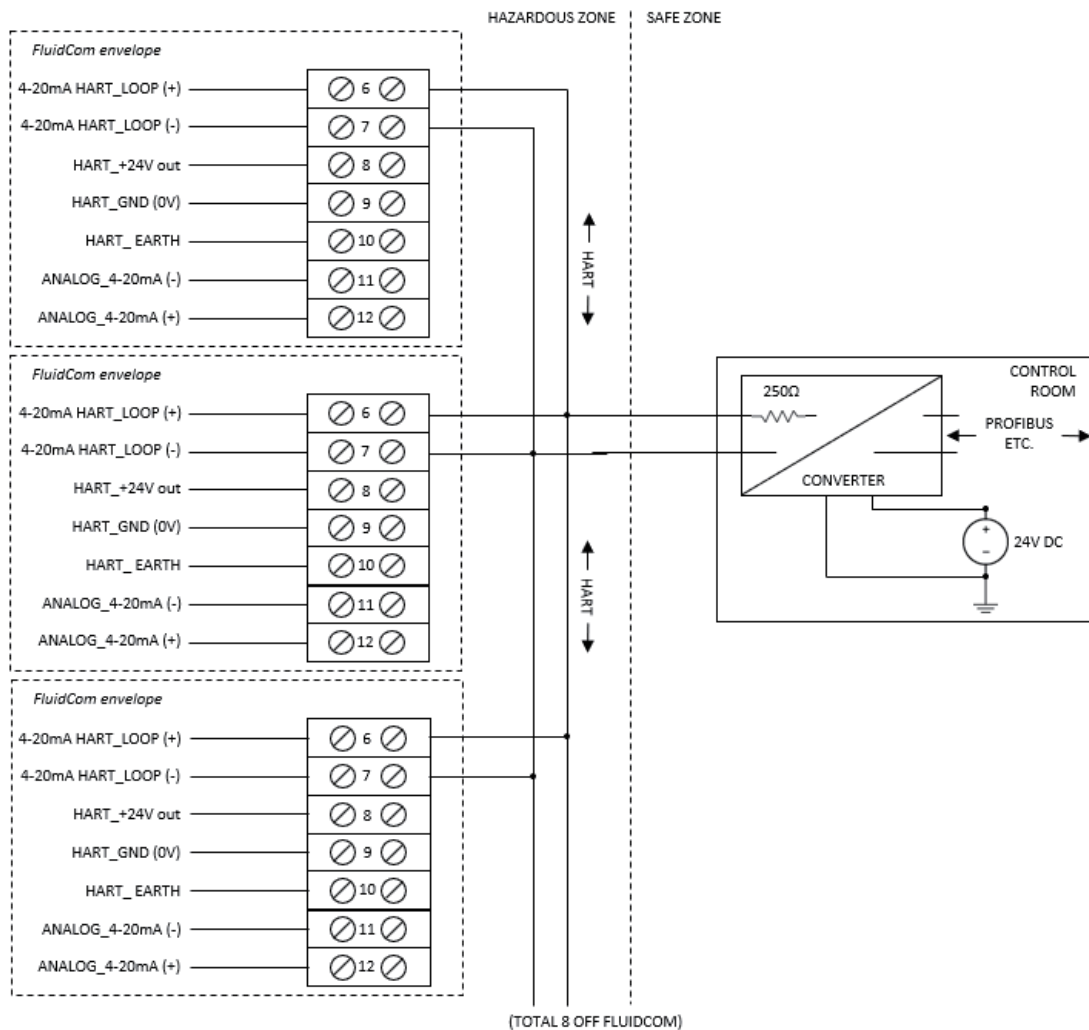


Figure 4.8 Multidrop operation by protocol conversion of HART to another communication protocol

NOTE

Manufacturer provides the needed information for programming of the communication protocol converter.

4.9.4.6 Multidrop operation by wireless HART

Figure 4.9 shows the wiring for the FluidCom S2 configuration providing multidrop operation by wireless HART. The maximum number of FluidCom S2 units per wireless HART antenna is eight. Information about HART polling addresses is found in section 5.3.2.

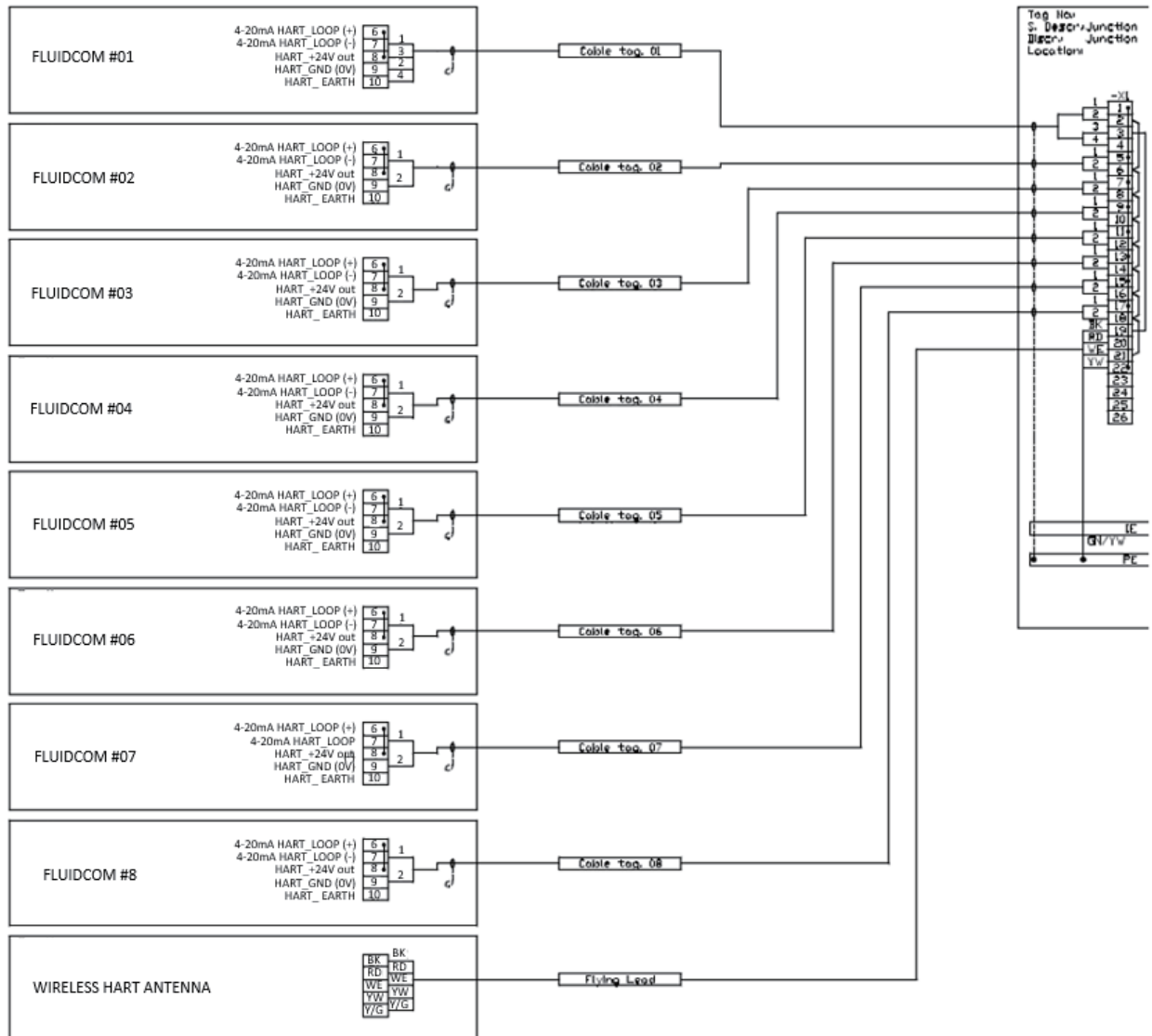


Figure 4.9 Multidrop operation by wireless HART

4.10 HART Communicator

The HART Field Communicator can be attached to the circuit through terminals no. 6 and 7 by use a terminal test plug and the bridge shaft on the terminal.

See section 5.3.1 for information regarding DD for the HART Field Communicator.



CAUTION

FluidCom S2 control loop is non-is. keep awareness to this when e.g. using HART Field communicator.

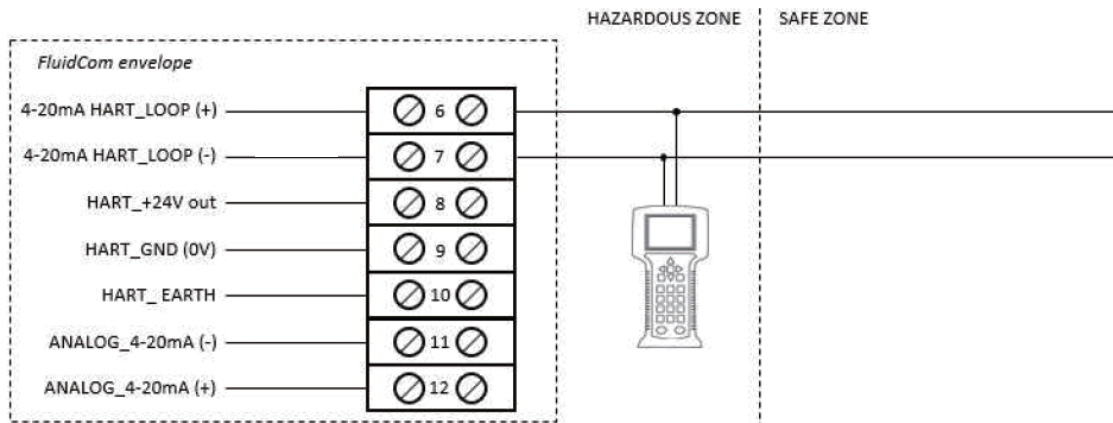


Figure 4.10 Connection of HART Field communicator

5. Commissioning

5.1 Safety

5.1.1 General



WARNING

Make sure all pressurized equipment (hoses, fittings, etc.) are certified for min. 345 bar (5000 psi).



WARNING

Make sure that particles larger than 50µm do not enter FluidCom S2. FluidCom S2 has a self-cleaning mechanism in its flowline. However, if more particles than expected enter, the valve may get clogged which makes it impossible for the valve to control the flow rate.

Please take measures such as installing a filter at the upstream side to maintain the fluid cleanliness level at NAS 6 or higher.



WARNING

Check that sufficient and clean filtration systems are installed upstream FluidCom S2. Recommended 50 micron.

IMPORTANT

FluidCom S2 must not be exposed to system hydrostatic test if this exceeds 345 bar. Such testing may interrupt the calibration of the unit. FluidCom S2 has been separately hydrostatic tested to 517 bar pressure prior to factory calibration.

5.1.2 Safe Job Analysis (SJA)



CAUTION

Perform and sign SJA as per site requirements.

5.1.3 Personal Protection Equipment (PPE)



CAUTION

Use PPE as required at site.

5.2 Start-up and system check

5.2.1 System start-up



WARNING

Do not perform start-up of FluidCom S2 before instrument tubing and all wiring are properly connected and the terminal cover is closed.



WARNING

Maximum working pressure is 345 bar (5000 psi).
System where FluidCom is intended to be used must have an overpressure safety device, with a set point securing that FluidCom design pressure of 345 bar (5000 psi) not overseeded.
For design of overpressure safety device see Standard 61010 clause 11.7.4.

Perform the start-up of FluidCom S2 according to the following procedure:

- 1) Verify that FluidCom S2 is properly installed to upstream and downstream equipment.
- 2) Check that adjoining process equipment are correctly adjusted.
- 3) If relevant, perform AI CALIB. according to section 3.5.3.9.
- 4) Power up FluidCom S2 by applying the electrical power supply. The local display verifies that the unit is powered.

NOTE

The default system state from factory is “stopped” after powering up.

IMPORTANT

Do not start control system (system state = “running”) without fluid in the system.

- 5) Verify that there is no leakage from the process connectors in the rear end of the FluidCom S2.

5.2.2 Pre-operation check and first operation start

NOTE

Before performing the system check, FluidCom S2 must be started up according to procedure in section 5.2.1.

Perform a pre-operation system check and the first operation start of FluidCom S2 according to the following procedure:

- 1) Set the inlet isolation valve to closed position.
- 2) Select “manual mode” (ref. section 3.5.3.6).
- 3) Start FluidCom S2 (ref. section 3.5.3.1).
- 4) Set flow to 100% (ref. section 3.5.3.7).
- 5) Monitor the heater temperature reaching 70-75°C (158-167°F). Do not allow temperature to exceed 85°C (185°F).

NOTE

It should take approximately 1 minute to heat up for fully open valve position.

IMPORTANT

Do not allow heater temperature to exceed 85°C (185°F). Stop FluidCom S2 if necessary.

- 6) Open the inlet isolation valve slowly. Verify the fluid flowing through the system by observing the heater temperature dropping. Let fluid flush through system for approximately 1 minute.
- 7) Stop FluidCom S2 (ref. section 3.5.3.1).
- 8) Set the inlet isolation valve to closed position.
- 9) Select “auto mode” (ref. section 3.5.3.6).
- 10) Set flow for operation (ref. section 3.5.3.2).
- 11) Set the inlet isolation valve to open position.
- 12) Start FluidCom S2 (ref. section 3.5.3.1).

NOTE

Set flow will be flashing in display approximately 15 minutes until flow is within range and FluidCom S2 will be in operation once the flashing stops.

5.3 HART commissioning

5.3.1 Device Descriptor (DD)

FluidCom S2 is delivered with two of Device Descriptor (DD) files; one for Emerson AMS (and other DD enabled host computer software), and one for Emerson Field Communicator (and other field communicators). These files must be installed in the relevant computers/devices to establish the control interface for FluidCom S2.

5.3.2 Polling addresses

The FluidCom S2 units with multidrop configuration are given HART polling addresses from 1 to 8. The test protocol document following each delivered FluidCom S2 provides the applicable polling address.

6. Maintenance and repair

NOTE

No regular maintenance of FluidCom S2 is required.

IMPORTANT

For longer shutdown of injection where chemical can change properties, coagulate or crystallize, action must be taken to purify FluidCom S2 for chemical. This is necessary to ensure full functionality of FluidCom S2 at start-up after injection stop/shutdown.

NOTE

For maintenance or repair, contact manufacturer or customer service for support.



CAUTION

Opening of enclosure should only be done by personnel authorised by manufacturer.

6.1 External maintenance

The FluidCom S2 enclosure can be cleaned as required. Use a non-aggressive cleaning agent and respect the IP rating of the equipment.

6.2 Internal maintenance

Maintenance of FluidCom S2 internal parts is normally not required. However, in event of an equipment malfunction, there might be a need for maintenance. Contact manufacturer or customer service for support.

6.3 Repair

If repair work is deemed necessary e.g. due to equipment malfunction, contact manufacturer or customer service for support.

7. Troubleshooting

NOTE

Use customer service for any type of support needed regarding FluidCom S2.

8. Decommissioning / Changing Fluids

8.1 Flushing

NOTE

Flushing is required to properly clean the FluidCom S2 piping system prior to operation with a different fluid or removal for taking out of service.

Perform the flushing of FluidCom S2 according to the following procedure:

- 1) Stop the FluidCom S2 control system (ref. section 3.5.3.1).
- 2) Connect FluidCom S2 to the flushing loop and apply a suitable flushing medium.
- 3) Set FluidCom S2 to “manual mode” (ref. section 3.5.3.6), apply 100% power (ref. section 3.5.3.7) and start control system (ref. section 3.5.3.1).
- 4) Continue flushing until the piping system is considered clean.
- 5) Stop the FluidCom S2 control system (ref. section 3.5.3.1).
- 6) Bleed off trapped pressure prior to disconnection.
- 7) Disconnect FluidCom S2 from the flushing loop.

8.2 Shutdown

Perform the shutdown of FluidCom S2 according to the following procedure:

- 1) Stop the FluidCom S2 control system (ref. section 3.5.3.1).
- 2) Shutdown FluidCom S2 by cutting the electrical power supply of 230 V AC 50/60 Hz.
- 3) Bleed off trapped pressure as required.

8.3 Removal



WARNING

Do not perform any removal work without properly isolating FluidCom S2 and remove pressure from fluid.



WARNING

Do not perform any removal work without deenergizing the power supply and isolating the signal loops.

Perform removal of FluidCom S2 according to the following procedure:

- 1) Open the terminal cover and disconnect the power supply cable from terminal L1, PE and N, and the signal cable from terminal 6 and 7.
- 2) Open cable glands and remove the cables from the enclosure.
- 3) Disconnect the external earthing cable.
- 4) Disconnect the piping from the bulkhead connectors.
- 5) Remove the FluidCom S2 from the installation panel.
- 6) Ensure FluidCom S2 is handled with care and being prepared for storage or shipment with proper means for protection.
- 7) Attach safety data sheet for latest chemical used with FluidCom S2.

NOTE

FluidCom S2 is ready for storage or shipment.

NOTE

Safety data sheet for the latest chemical used shall be followed when storing and shipping FluidCom S2.

9. Dismantling and disposal

9.1 Decontamination and return shipment



WARNING

Use of fluids that are a health hazard may result in caustic burns or poisoning.

1. When removing FluidCom S2, avoid touching the fluid and breathing gas residues left in the unit.
2. Wear protective clothing/equipment and breathing mask as prescribed in chemical SDS.

Note the following items before returning the shipment:

1. Clean FluidCom S2 thoroughly. No harmful chemicals must remain in or on FluidCom S2.
2. "Decontamination Declaration" must be done and sent to Yokogawa along with the flow meter together with chemical SDS.
3. Package FluidCom S2 in a shockproof manner for transport.

9.2 Disposal

Prior to disposal of the flow meter, please take note of the following:

1. Comply with the applicable national regulations in the event of disposal or recycling.
2. Remove all fluid residues before dismantling FluidCom S2 and dispose of the parts individually.

10. Transport and storage

10.1 Lifting and carrying

The weight of FluidCom is 17.5 kg. FluidCom does not have a handle or grip. Therefore, when lifting or carrying it, use anti-slip gloves to secure your grip as much as possible.

10.2 Transport

Follow the precautions below when transporting FluidCom:

- 1) Observe the transport-related instructions on packaging.
- 2) To avoid damage, do not unpack FluidCom until it reaches the installation site.
- 3) Do not remove protective materials, such as stickers or covers from the process connections during transport.
- 4) The weight of FluidCom is 17.5 kg. Have two or more people to lift and transport it. Use suitable tools where needed, such as a shoulder strap, lifting device or cart.

10.3 Storage

Follow the precautions below when storing FluidCom:

- 1) Store FluidCom in a location where mechanical influence is avoided.
- 2) Ensure that the storage temperature does not go outside of the range of -20°C to + 55°C which is defined in the specifications.
- 3) Protect FluidCom from rain and inappropriate humidity.
- 4) Keep protective materials such as stickers or covers on process connections and re-apply them when storing.
- 5) When storing **used** FluidCom, make sure to drain all fluids from the measuring tube, as well as from the process and heat tracing connections (if applicable). And then thoroughly clean the flow meter. See Dismantling and disposal for the details.
- 6) For long term storage change/replace the Zerust VCI or similar emitters once a year.

11. APPROVALS AND STANDARDS

11.1 ATEX/IECEX Certification

■ Ex INSTRUCTION MANUAL

1) INTRODUCTION

The FluidCom S2 chemical injection flow controller is intended for operation in explosive gas atmospheres and is consequently designed and certified according to the ATEX directive 2014/34/EU and the IECEx international certification system.



WARNING

Yokogawa Techninvent AS has designed, manufactured and tested this equipment to meet national and international standards. This equipment must be installed, operated and maintained according to the following instructions. Failure in following these instructions may cause injury on personnel, damage on property, damage to this equipment, and invalidation of warranty.

2) MANUFACTURER ADDRESS

For customer support, please use the contact information on the last page.

3) TYPE APPROVAL

The FluidCom S2 has and EU type examination certificate issued by Presafe and has been approved to the following standards:

EN/IEC 600079-0	General requirements
EN/IEC 60079-7	Increased safety “e”
EN/IEC 60079-18	Encapsulation “m”
EN/IEC 60079-1	Flameproof enclosures “d”

When manufactured, a routine dielectric strength test is executed on each unit according to IEC 60079-7 cl. 7.1. The test voltage of 2100 V DC is applied between the 230 V phase and neutral conductors and the FluidCom S2 chassis (ground). Normally additional dielectric strength tests are not required.





CAUTION

Do not perform dielectric strength tests more frequently than absolutely necessary.

With reference to IEC 60079-7 cl. 5.8, the internal heating device has a positive temperature coefficient in the range +20°C to +1000°C, it has a nominal resistance at +20°C of 264.5 Ω ±10%, and the cold-start current at -20°C is maximum +10% with reference to nominal resistance.

4) MARKING

All FluidCom S2 units have a marking plate located on the rear end with the following information.

Type:	FluidCom S2
Manufacturer:	Yokogawa Techninvent AS Prof. Olav Hanssens vei 7 A 4021 STAVANGER NORWAY
CE mark + NB no.:	 2460
ATEX code:	 II 2 G
Ex code:	Ex eb mb IIB T3 Gb – or Ex db eb mb IIB T3 Gb (earlier models) (variant with 4-20 mA control signal)
ATEX certificate no.:	Presafe 16 ATEX 7817
IECEx certificate:	IECEx PRE 17.0029
Inmetro:	DNV 000019
Ambient temperature:	$-20^{\circ}\text{C} \leq T_a \leq 55^{\circ}\text{C}$
IP grade:	IP66
Voltage:	230 V AC
Frequency:	50/60 Hz
Current:	1 A
Wattage:	100 W
Prospective short circuit current:	1500 A
Max working pressure:	345 bar / 5000 psi
Weight:	17.5 kg
Year of construction:	-
Serial no.:	-

**WARNING**

Enclosure to be opened by authorised personnel only warning – do not open when an explosive atmosphere is present.

5) INSTALLATION

The FluidCom S2 can be installed in areas with the following conditions:

AREA CLASSIFICATION	
Zone 1	Explosive gas air mixture likely to occur in normal operation.
Zone 2	Explosive gas air mixture not likely to occur in normal operation, and if it does, it will only exist for a short period of time.

GAS GROUPING	
IIA	Typical gas is Propane / Methane
IIB	Typical gas is Ethylene

TEMPERATURE CLASSIFICATION	
T3	Max surface temperature < 200°C

AMBIENT TEMPERATURE	
T _a	-20°C ≤ T _a ≤ 55°C

**CAUTION**

Only trained personnel shall install and operate this equipment.

Before installation:

Dismantle and remove the Support Ring (plastic material) in rear end of enclosure. Installation with the Support Ring attached is not permitted.

Mounting:

It is strongly advised to use purpose made mounting brackets for installation. The enclosure provides IP66 protection and is suitable for installation in exterior locations.

Avoid exposure to direct sunlight if possible. The FluidCom S2 can be installed having any orientation.

Earthing:

The unit must be connected to a good quality earth. When using the external earthing point, a cable with a minimum 6 mm² cross-sectional area must be used. Use of cable lug is required.

6) CONNECTION*Pipe connection:*

Make sure the inlet and outlet pipes are correctly connected, and that the connected piping system do not exert excessive forces on the FluidCom S2.

Electrical wiring:

Electrical power and control cables must have an outer diameter of Ø10-18 mm (cable gland size). Remove Terminal Cover in rear end of enclosure for connection of conductors. Use cable ferrules for safe connection to terminals. Conductor size must be 0.75 – 2,5 mm². Tighten terminals using 0.5-0.6 Nm torque.

FluidCom S2 power supply must include an RCD with a tripping current <100 mA (30 mA preferred) and a tripping time <100 ms. Connection for remote control is a standard 4-20 mA control loop. Communication protocol is HART v.7.1. Only equipment approved for a standard 4-20 mA control loop is permitted to be connected to the FluidCom S2.

WIRING – EXTERNAL CONDUCTORS		
Terminal no.	Conductor	Cable
L1	Phase	230 V AC
PE	Earth	
N	Neutral	
6	4-20 mA/HART_LOOP (+)	Bi-directional HART / Analog flow read Terminals 8-10 only to be used when "Multidrop operation by wireless HART"
7	4-20 mA/HART_LOOP (-)	
8	HART_+24 V out	
9	HART_GND (0 V)	
10	HART_EARTH	

7) SAFE USE

Main control of unit is intended to be remotely by 4-20 mA HART. Local control is possible by use of display and control buttons in front of unit.

**WARNING**

Maximum working pressure is 345 bar (5000 psi).

**WARNING**

Electrical nominal power supply shall be 230 V AC 50/60 Hz.

**CAUTION**

Do not use this equipment with any other fluids than listed in control software.

8) MAINTENANCE

No regular maintenance of FluidCom S2 is required. All types of maintenance and repair work shall be performed by Yokogawa TechInvent AS only.

NOTE

No end user repair, maintenance or modifications are allowed.

**CAUTION**

Opening of enclosure is not permitted for end user.

Cleaning of outside surfaces of enclosure is allowed. Use a non-aggressive cleaning agent and respect the IP rating of the unit.

9) SAFETY

The FluidCom S2 must be installed, operated and maintained according to the instructions given in this instruction document.

11.2 QPS Certification

1) INTRODUCTION

The FluidCom S2 chemical injection flow controller is intended for operation in explosive gas atmospheres and is consequently designed and certified according to the QPS certification system.

2) TYPE APPROVAL

The FluidCom S2 has certificate issued by QPS and has been approved to the following standards:

UL 60079-0: 7th ed.

UL 60079-1: 7th ed.

UL 60079-7: 5th ed.

UL 60079-18: 4th ed.

ANSI/ISA 121201 9th ed.

UL 61010-1 3rd ed.

ANSI/ IEC 60529-2020

CAN/CSA C22.2 No. 60079-0:2019

CAN/CSA C22.2 No. 60079-1: 2016

CAN/CSA C22.2 No. 60079-7: 2016

CAN/CSA C22.2 No. 60079-18: 2016

CSA C22.2 No. 213-17

CAN/CSA C22.2 No. 61010-1-12

CSA C22.2 No. 60529:16 (R2021)

3) MARKING

Type: FluidCom S2

Manufacturer: Yokogawa Technivent AS Prof. Olav Hanssens vei 7 A 4021
STAVANGER NORWAY

Ex code: Ex db eb mb IIB T3 Gb
Class I, Zone 1, AEx db eb mb IIB T3 Gb
Class I, Division 2, Groups C, D T3

QPS certificate: LR1559-1

Ambient temperature: $-20^{\circ}\text{C} \leq T_a \leq 55^{\circ}\text{C}$

Process: T_{pmax} (max. process temperature): 55 °C

MWP: (max. working pressure): 345 bar (5000 psi)

IP grade: IP66

Voltage: 230 V AC

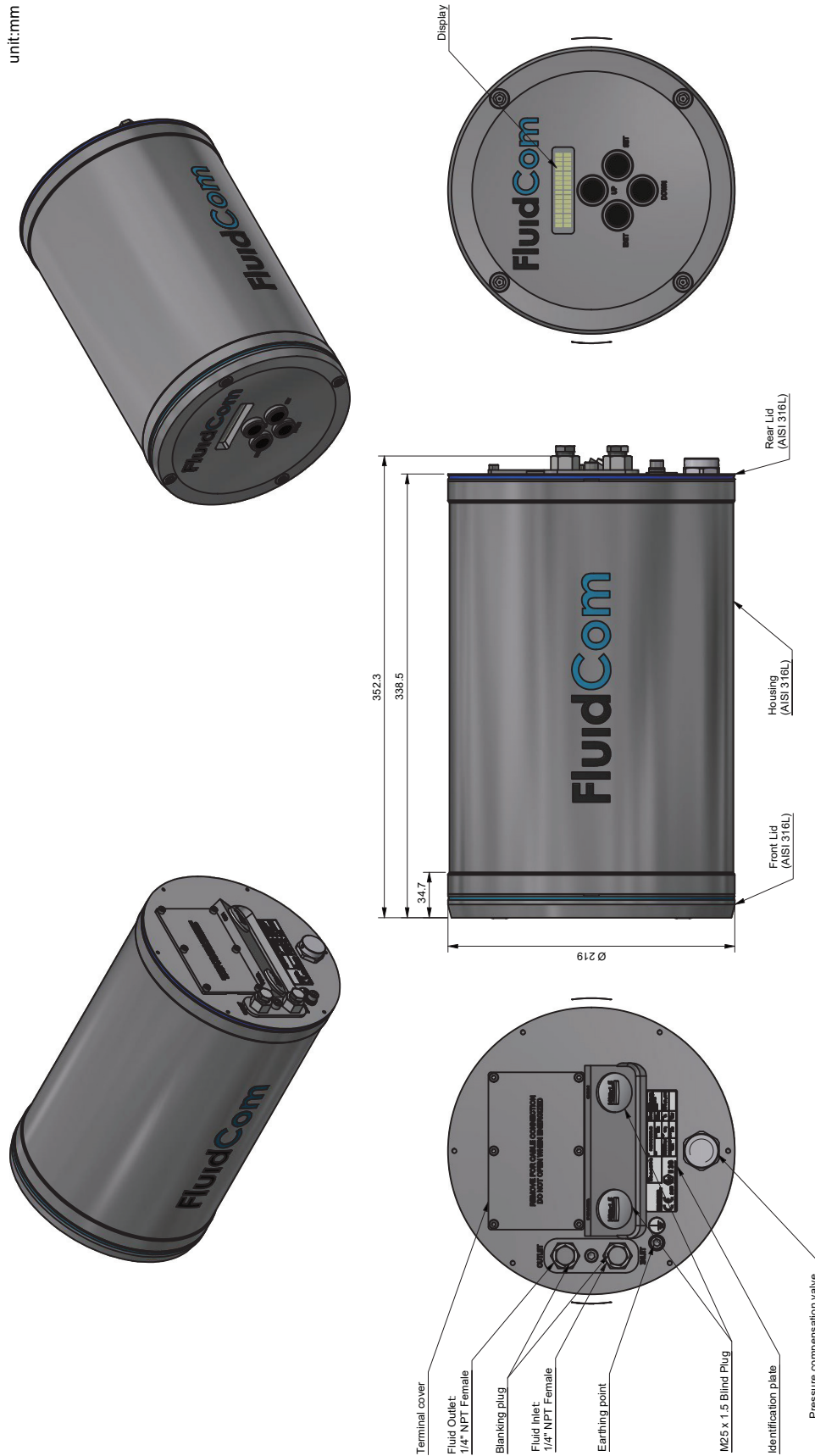
Frequency: 50/60 Hz

Current: 0.47 A

Wattage: 100 W

APPENDIX A – GA DRAWING

unit:mm



FluidCom General Arrangement

FluidCom is delivered without cable glands.
The following requirements are applicable for the cable glands to be mounted:

- ATEX and IECEx certified, not compromising the FluidCom Ex protection;
- ingress protection minimum IP66;
- preferred providing PE contact for the cable armour;

APPENDIX B – EU-TYPE EXAMINATION CERTIFICATE

APPENDIX C – EU DECLARATION OF CONFORMITY

APPENDIX D – CERTIFICATE OF CONFORMITY

Revision Information

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Edition	Date	Page	Revised item
1st	May 2021	—	New publication
2nd	July 2022	1-3 to 1-5 2-1 2-2 4-1 4-2 4-3 4-4 4-5 4-6 5-2 11-1 to 11-6 App A-1	Add items Modify Table 2.1. Modify picture comments of Figure 2.2. Newly add 4.1. Modify 4.4 text. Modify Table 4.1. Modify text and NOTE. Modify 4.9 text. Modify test and NOTE, Add WARNING. Add 4.9.2 NOTE, modify 4.9.3 NOTE. Modify NOTE. Modify WARNING. Move Appendix B contents to new Chapter 11. Add a unit.

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