Honeywell Enraf

Installation & Operation Manual
Fusion4 SSC-B

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CHAPTER 1 GENERAL

1.1 Product Introduction

The *Fusion4 Single Stream Controller-Blending*, further in this manual referred to as ***SSC-B***, is a hazardous area, intelligent blend controller, utilising state-of-the-art microprocessor technology for high-accuracy blending applications.

The MID-compliant SSC-B is designed to control one single blend stream. It can operate in any product transfer application, such as road tanker loading, rail off-loading or pipeline transfer, where multiple products need to be accurately combined.

The basic principle of operation (see FIGURE 1-1) is achieved by the SSC-B controller monitoring the flow of the *wild stream*, and using this flow rate to accurately pace the flow of the *blend stream* to a pre-determined target blend percentage or ratio.

The pacing of the blend stream is achieved through digitally controlled solenoid valves that modulate the position of a variable control valve in the blend stream.

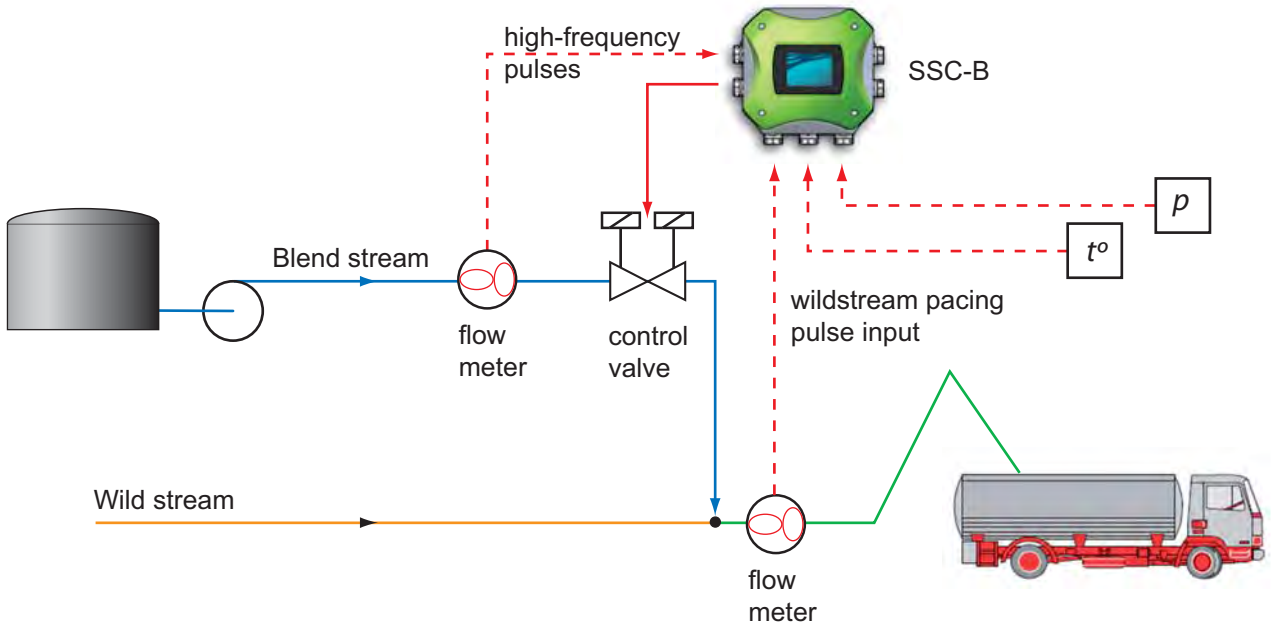


FIGURE 1-1 Basic SSC-B principle of operation F4B10-0001

1.2 Functionality Overview

Functionality	SSC-B
Common hardware platform (Additive & Blending)	√
Common firmware version (Additive & Blending)	√
Global Ex approvals (ATEX, FM, CSA, IECEx)	√
ASTM-compliant temperature and pressure compensation	√
Expandable I/O hardware	√
Firmware in-situ upgradeable	√
Fully configurable I/O binding	√
Diagnostics dashboard	√
Configuration upload/download	√
Transaction and calibration logs upload/download	√
Interface to Fusion4 Portal (printing, and so on)	√
Multi language display	11
Free programmable language pack	1
Transaction storage	10,000
Alarm log records	128
Calibration log records	100
Comms ports	2
Digital inputs	13
Digital outputs	7
Analog I/O and RTDs	3

1.3 Target Group for this Manual

This manual is intended for engineers and technicians, who are assigned to install, commission and service the SSC-B.

FIGURE 1-2 SSC-B in Fusion4 blend stream control arrangement

CHAPTER 2 SAFETY

2.1 Safety Conventions

2.1.1 Warnings

Following warning mark is used in this document to urge attention in order ***to prevent personal injuries or dangerous situations***, further described in this document.

Symbol	Description	Remark
	General warning	Will always be explained by text.

2.1.2 Cautions

Following caution mark is used in this document to urge attention in order ***to prevent damages to the equipment*** described in this document.

Symbol	Description
	General caution sign
	ElectroStatic Discharge (ESD) sensitive device

2.2 Safety Instructions for the SSC

2.2.1 General

WARNING! One must strictly follow the safety instructions mentioned in this manual as well as the safety instructions shipped with the device for installation, commissioning, operation, and maintenance, to ensure safe operation.

The SSC may be located in explosion safety areas:

USA (FM) **and Canada** (CSA)		**Canada** (CSA)		**Rest of the World** (ATEX / IECEx)	
Safety level	**Remarks**	**Safety level**	**Remarks**	**Safety level**	**Remarks**
Class 1, Division 1	 *WARNING!* Do NOT open when an explosive atmosphere may be present.	Zone 1	 *WARNING!* Do NOT open when an explosive atmosphere may be present.	Zone 1	 *WARNING!* Do NOT open when an explosive atmosphere may be present.
	 *CAUTION!* Seal conduit in 18 inches.		 *CAUTION!* Seal conduit in 18 inches.		
Class 1, Division 2	 *WARNING!* Do NOT open when an explosive atmosphere may be present.	Zone 2	 *WARNING!* Do NOT open when an explosive atmosphere may be present.	Zone 2	 *WARNING!* Do NOT open when an explosive atmosphere may be present.
	 *CAUTION!* Seal conduit in 18 inches.		 *CAUTION!* Seal conduit in 18 inches.		
Safe Area	-	Safe Zone	-	Safe Zone	-

2.2.1.1 EC Declaration of Conformity (for EU)

Refer to the EC declaration of conformity shipped with the device.

2.2.1.2 Control Drawings for FM & CSA

Refer to the control drawings shipped with the device.

2.2.1.3 Users

The mechanical and electrical installation must be carried out only by trained personnel with knowledge of the requirements for installation of explosion-proof equipment in hazardous areas.

The entire installation procedure must be carried out in accordance with national, local, and company regulations.

The entire electrical installation shall be carried out in accordance with the national requirements for electrical equipment to be installed in hazardous areas.

NOTE: See EN IEC 60079-14 or NEC (NFPA70).

2.2.1.4 Additional Information

If you require additional information, contact Honeywell Enraf or its representative. See the back cover of this manual.

2.2.1.5 Environmental Conditions

Observe the environmental conditions regarding the allowable operating temperature (-40°C ... +65°C/ -40ºF ... +149ºF) and relative humidity (RH 5 ... 95%, non-condensing).

2.2.2 Personal Safety

WARNING! In hazardous areas it is compulsory to use personal protection and safety gear.
This can be: Safety helmet, fire-resistive overall, safety shoes, safety glasses, working gloves, LEL-meter.

Pay attention to the kind of product involved. If there is any danger for your health, wear a gas mask and take all necessary precautions.

WARNING! Take appropriate precautions when chemical or toxic product vapors are present (compressed air, chemical protection suit, detection equipment).

2.2.2.1 General

2.2.2.1.1 Repairs and Maintenance

WARNING! Any repairs or parts replacements must be carried out by the manufacturer or its appointed repair agent!

2.2.2.1.2 Opening of the Device

WARNING! It is forbidden to open the device in an explosive hazardous environment, unless otherwise stated on the safety label.

WARNING! Treat the flange surface of the cover and the housing with care.
Keep the flange surface free of dirt.
The O-ring must be present and undamaged.

2.2.2.1.3 Tools

WARNING! Use non-sparking tools and explosion-proof testers. Use suitable explosion-proof tools (for example, testing devices)!

2.2.2.1.4 Working Environment

WARNING! Avoid generation of static electricity. Make sure no explosive gas mixtures are built up in the working area.

2.2.2.1.5 Required Skills

WARNING! The technician must have technical skills to be able to safely install the equipment. The technician also must be trained to work in accordance with the national requirements for electrical equipment in hazardous areas.

2.2.3 Electrical

2.2.3.1 Safety Standards

- The entire electrical installation must be in accordance with the International Standard EN IEC 60079-14 for electrical equipment in hazardous areas or with NEC (NFPA70) requirements.
- The stopping plugs, cable glands and reducers must be installed in accordance with appropriate IP requirements
- Use suitable flameproof (Ex d) compound barrier glands (due > 2 litres IIB) for the SSC.
- Improper installation of cable glands, conduits or stopping plugs invalidates the Ex approval of this device.

2.2.3.2 Grounding

WARNING! Make sure the housing of the device is properly connected to ground reference! See FIGURE 2-1. Make sure the electrical resistance of the ground connections is below the maximum prescribed by local requirements!

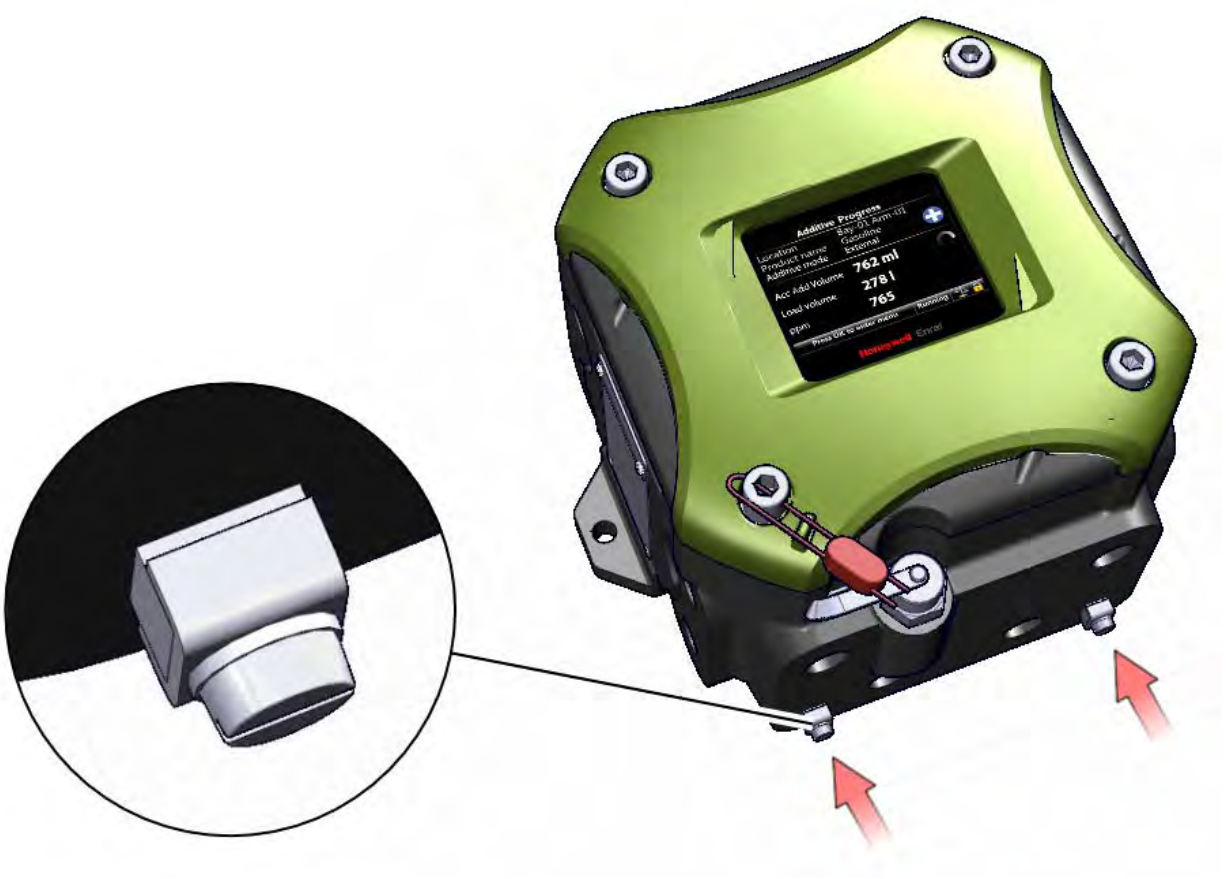


FIGURE 2-1 The grounding connections of the SSC-B

F4A10-0002

2.2.4 Accordance to Regulations

2.2.4.1 Explosion Safety

Approval	Certificate no.	Type of protection identification		
ATEX	KEMA 10ATEX0095 X	⟨Ex⟩ II 2 G	Ex d [ia] IIB T6 Gb	T_a = -40°C ... +65°C (-40ºF ... +149ºF)
IECEx	IECEx KEM 10.0044 X	Zone 1		
FM	3040469	Class I, Division 1	group C, D T6	
CSA	11.2370409	Class I, Division 1	group C, D T6	
		Zone 1	Ex d [ia] IIB T6	

2.2.4.2 Low-Voltage Directive

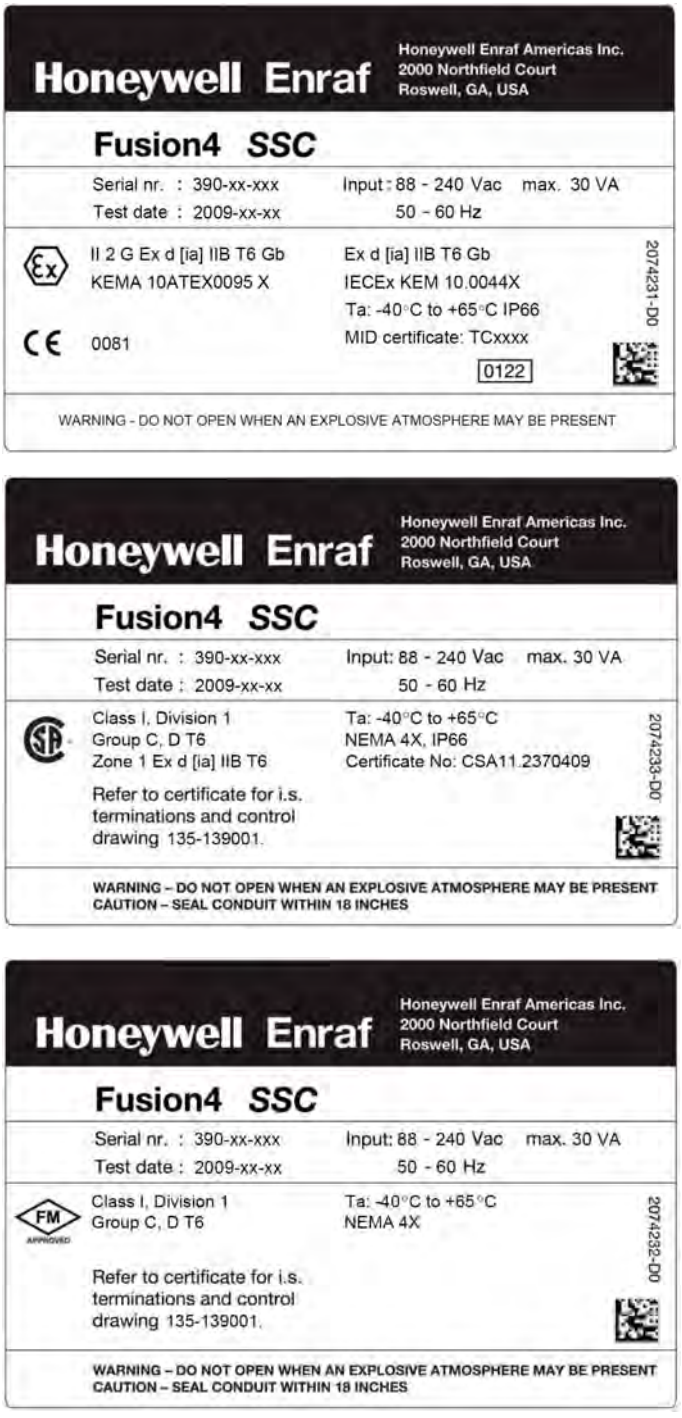
The device is suitable for:

- Pollution degree 2
- Overvoltage category II
- Class I equipment

2.2.4.3 Reference of Applicable Standards

Standard	Description
ATEX 95	Applicable for manufacturers of equipment that is used in places where explosion danger may exist.
IECEx	The IECEx System is an International Conformity System where a Mark of Conformity is granted by approved IECEx certifiers (ExCBs) located in IECEx participating countries for equipment that is covered by an IECEx Certificate of Conformity and hence has been tested and manufactured under systems that are under ongoing surveillance by ExCBs.
FM	Factory Mutual Approvals Division The Factory Mutual Approvals Division determines the safety and reliability of equipment, materials, or services utilized in hazardous locations in the United States and elsewhere.
CSA	Canadian Standards Association The standards generated by CSA are the cornerstone for determining a product's eligibility for certification in hazardous locations in Canada.

2.2.5 SSC-B Labels



NOTE to FM label:

Ta = -40°F to +149ºF

FIGURE 2-2 Identification labels with Safety note on the SSC

2.3 Safety Instructions for the LAD

FIGURE 2-3 The Local Access Device (LAD)

WARNING! One must strictly follow the safety instructions mentioned in this manual as well as the safety instructions shipped with the device for installation, commissioning, operation, and maintenance, to ensure safe operation.

The LAD may be located in explosion safety areas:

USA (FM) **and Canada** (CSA)		**Canada** (CSA)		**Rest of the World** (ATEX / IECEx)	
Safety level	**Remarks**	**Safety Level**	**Remarks**	**Safety level**	**Remarks**
Class 1, Division 1	*WARNING!* Substitution of components may impair intrinsic safety.	Class 1, Division 1 resp. Zone 1	*WARNING!* Substitution of components may impair intrinsic safety.	Zone 1	-
Class 1, Division 2	*WARNING!* Substitution of components may impair intrinsic safety.	Class 1, Division 2 resp. Zone 2	*WARNING!* Substitution of components may impair intrinsic safety.	Zone 2	-
Safe Area	-	Safe Zone	-	Safe Zone	-

2.3.1 General

The Local Access Device (LAD) is a hand-held controller used to interface with the Fusion4 product family, allowing tasks such as parameter adjustment, alarm resetting, and injector calibration. The device facilitates two-way data communication between a parent device and the LAD. It allows the rapid transfer of transaction data, configuration files and calibration records, and also upgrading the firmware in the field.

WARNING! Only use the instrument for its intended purpose.

2.3.1.1 EC declaration of conformity (for EU)

Refer to the EC declaration of conformity and ATEX certificate(s), shipped with the device.

2.3.1.2 Control Drawings for FM & CSA

Refer to the control drawings shipped with the device.

2.3.2 Explosion Safety

Approval	Certificate no.	Type of protection identification		
ATEX	KEMA 10ATEX0152	Ⓔx II 2 G	Ex ia IIB T4 Gb	T_a = -20°C ... +65°C (-4ºF ... +149ºF)
IECEx	IECEx KEM 10.0070	Zone 1		
FM	3041202	Class I, Division 1	group C, D T4	
CSA	11.2395571	Class I, Division 1	group C, D T4	
		Zone 1	Ex ia IIB T4	

2.3.3 Installation

No specific installation requirements apply, the device is factory ready for connection to Fusion4 parent devices (for example, SSC).

WARNING! This is an Intrinsically safe device and as such may only be connected to devices with compatible intrinsically safe parameters.
Connection of non-intrinsically safe signals invalidates the approval. The electrical data of the intrinsically safe circuits is to be taken from the certificate.
Connection to SSC is safe by design.

2.3.4 Commissioning

Commissioning the instrument and Fusion4 parent devices must be conducted by qualified engineers, trained by Honeywell Enraf. The engineers must have the knowledge of the (local) requirements for electrical equipment in hazardous areas.

2.3.5 Operation

After connecting to a Fusion4 parent device (for example, SSC), the LAD can be used for its intended purpose.

The memory card can be removed and inserted also in hazardous areas, but be aware that the device is then no longer suitably protected against ingress of water.

2.3.6 Maintenance and Troubleshooting

In the unlikely event of malfunction, only a qualified service engineer, trained by Honeywell Enraf and with knowledge of safety regulations for working in hazardous areas is allowed to repair the instrument.

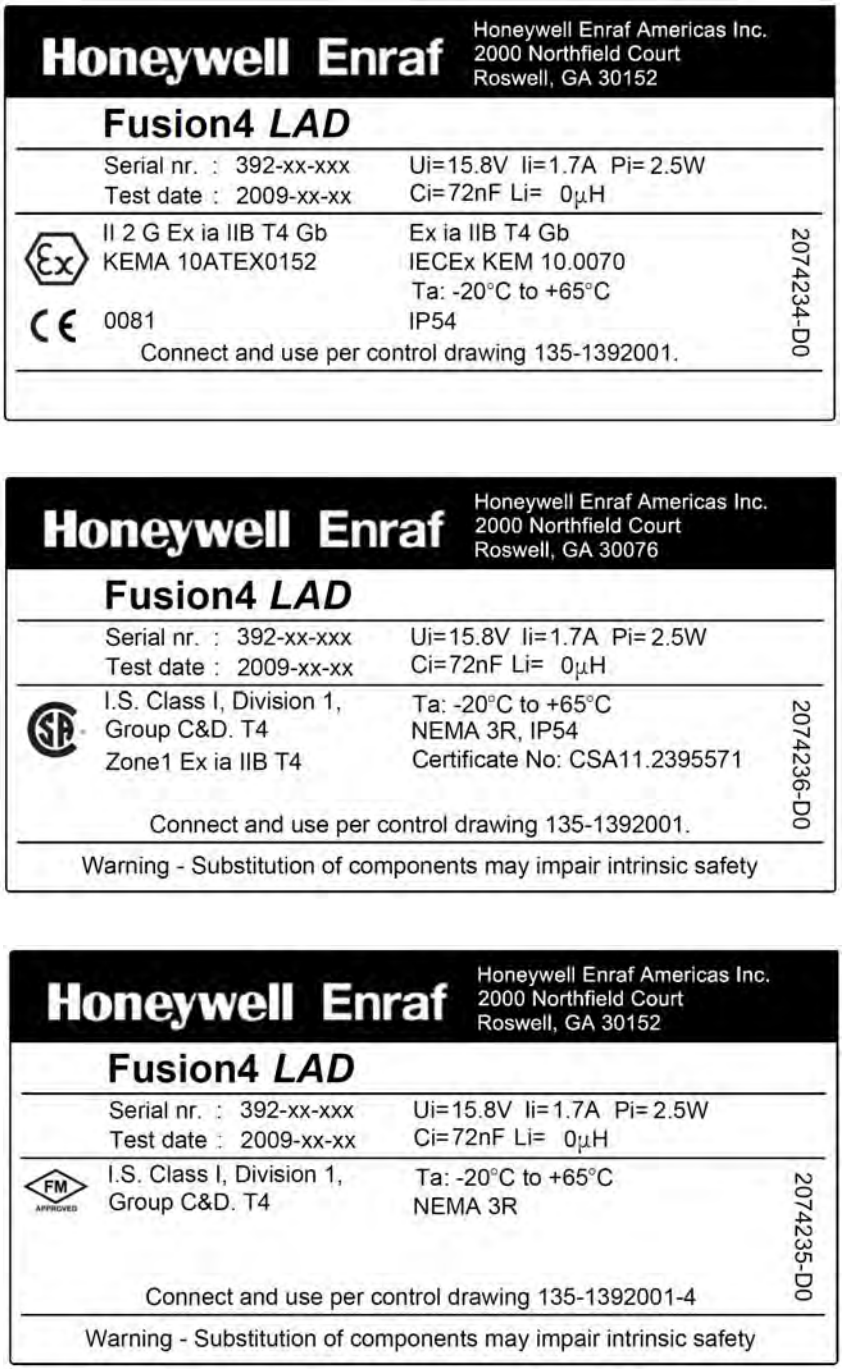
2.3.7 Additional Information

If you require additional information, contact Honeywell Enraf or its representative. See the back cover of this manual.

2.3.8 Environmental Conditions

Observe the environmental conditions regarding the allowable operating temperature (-20°C ... +65°C/ -4ºF ... +149ºF), relative humidity (RH 5 ... 95%, non-condensing), and operating pressure (atmospheric).

2.3.9 LAD Labels



NOTE to FM label:

Ta = -4°F to +149ºF

FIGURE 2-4 Identification labels with Safety note on the LAD

2.4 Safety Instructions for the Fusion4 IR Controller

FIGURE 2-5 Safety instructions for the Fusion4 IR Controller

WARNING! You must strictly follow the safety instructions mentioned in this manual as well as the safety instructions shipped with the device for installation, commissioning, operation, and maintenance to ensure safe operation.

The IR Controller may be located in explosion safety areas as follows:

USA (FM) **and Canada** (CSA)		**Canada** (CSA)		**Rest of the World** (ATEX / IECEx)	
Safety level	**Remarks**	**Safety Level**	**Remarks**	**Safety level**	**Remarks**
Class 1, Division 1	*WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.	Class 1, Division 1	*WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.	Zone 1	*WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.

USA (FM) **and Canada** (CSA)		**Canada** (CSA)		**Rest of the World** (ATEX / IECEx)	
Safety level	**Remarks**	**Safety Level**	**Remarks**	**Safety level**	**Remarks**
Class 1, Division 2	 *WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.	Class 1, Division 2	 *WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.	Zone 2	 *WARNING!* Do not open battery compartment in a hazardous area. Use only approved batteries, see label.
Safe Area	-	Safe Zone	-	Safe Zone	-

2.4.1 General

The GCHHC-4 IR Controller is a hand-held remote controller which is an infrared type control device. The device facilitates to program the Enraf fluid technology IR Controlled equipment remotely.

The device contains all the necessary program codes installed. Hence, user programming is not required.

2.4.2 Precautions

- Clean the device with a damp cloth.
- Use additional protection in areas where damage may occur.
- Do not repair the device without permission to avoid the invalidation of the certificate.
- Do not leave the device in direct sunlight or place it near a heat source.
- Do not drop the device or subject it to other types of stress. Handle the device gently.
- Do not touch any solvent or aggressive substances as the enclosure is made up of plastic.
- Store the device at room temperature in a clean and dry location.
- Ensure to use the correct type of the batteries to prevent damage to the device or shorten the battery life.
- Ensure that the buttons are not pressed to prevent the usage of batteries when storing the device.
- Ensure to remove the batteries to prevent damage caused by leaking batteries before storing the device for a long time.

2.4.2.1 EC declaration of conformity (for EU)

Refer to the EC declaration of conformity and ATEX certificate(s), shipped with the device.

2.4.3 Installation

Perform the following steps to install the device.

- Remove the security screws from the compartment lid.
- Slide the battery compartment lid from the device.
- Install the 3 AAA Alkaline batteries ensuring that the plus (+) and the minus (-) polarity of the batteries is correct.

NOTE: Removing the batteries does not remove the GCHHC-4 memory.
Always replace the batteries with new ones.
Use only batteries approved for use.

WARNING! Do not open the battery compartment or change the batteries in a hazardous area.

2.4.4 Commissioning

IR Controller and Fusion4 parent devices must be commissioned by qualified engineers, trained by Honeywell Enraf. The engineers must have the knowledge of the local requirements for electrical equipment in hazardous areas.

2.4.5 Operation

After connecting to a Fusion4 parent device (for example, SSC) the GCHHC-4 IR Controller can be used for its intended purpose.

Perform the following steps to use the device.

- Direct the device at the IR port of the equipment to be programmed.
- Select **ATTN** on the IR Controller to turn the device and send the initial program command to the equipment (SSC).

REMARK: Refer to the specific equipment's user manual for defined programmed functions.
The device automatically stops after 30 seconds if an activity is not performed. This helps in preserving the battery life.

2.4.6 Maintenance and Troubleshooting

In the unlikely event of malfunction, only a qualified service engineer, trained by Honeywell Enraf and with knowledge of safety regulations for working in hazardous areas is allowed to repair the instrument.

2.4.7 Additional Information

If you require additional information, contact Honeywell Enraf or its representative. For more information about Honeywell Enraf's solutions, see the back cover of this manual.

2.4.8 IR Controller Labels

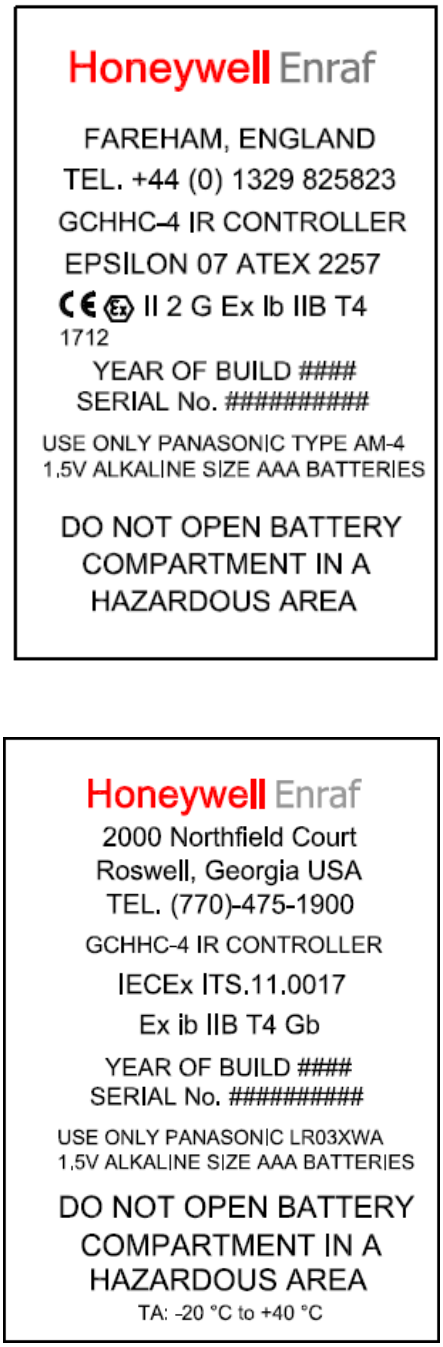


FIGURE 2-6 Identification labels with Safety note on the GCHHC-4 IR Controller

2.5 Liability

The information in this installation guide is the copyright property of Honeywell International Inc. Honeywell International Inc. disclaims any responsibility for personal injury or damage to the equipment caused by the following:

- Deviation from any of the prescribed procedures,
- Execution of activities that are not prescribed,
- Neglecting the safety regulations for handling tools and use of electricity.

The contents, descriptions, and specifications in this manual are subject to change without notice. Honeywell International Inc. accepts no responsibility for any errors that may appear in this manual.

WARNING! Only certified technicians are authorized to make changes to the SSC configuration. All modifications must be in accordance with the guidelines as set forth by Honeywell International Inc. Modifications not authorized by Honeywell International Inc. invalidates the approval certificates.

CHAPTER 3 SYSTEM DESCRIPTION

3.1 Introduction

3.1.1 General

The main function of the MID-compliant SSC-B is to control one single blend stream.

It can operate in any product transfer application, such as road tanker loading, rail off-loading or pipeline transfer, where multiple products need to be accurately combined.

3.1.2 Blending Principle

The SSC-B utilizes two product streams; the monitored stream is referred to as the *wild stream*, and the controlled stream is referred to as the *blend stream*.

Blend percentages can be adjusted in the SSC-B "on the fly". This allows external sensors to determine product composition and make adjustments to the blending operation through serial communications.

The SSC-B is capable of achieving highly accurate linear control across the complete blend range; allowing for blend ratios from 1% to 100% (practical blend rates are around 5% to 40%) on standard load rack applications.

Temperature and pressure measurements are used to convert the observed blend volume to reference conditions, in order to have very accurate blend transaction data that can be used for W&M-compliant custody transfer.

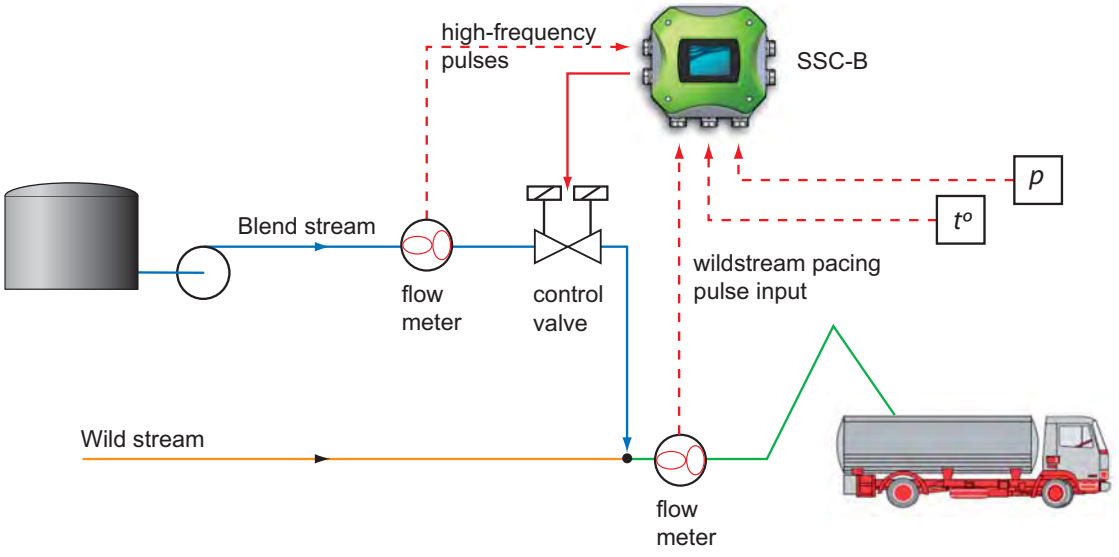


FIGURE 3-1 Blending principle diagram

3.2 MID Compliance

3.2.1 Introduction

The **Measuring Instruments Directive** (2004/22/EC) was designed to provide a level playing field in Europe, for custody transfer measuring equipment and systems. The **MID**, as it is called, currently covers 10 instrument categories, for uniform legislation in the 27 EU countries. The implementation of this directive in national legislation became due on the 30th of October 2006.

The SSC is 100% MID-compliant.

This legislation results in breaking down trade barriers and improving competition, which is one of the main objectives of the European Union. In the directive, the specific articles on each of the instrument categories are called Annexes. The Annex relevant to the measurement of petroleum products is **"flow metering of liquids other than water"** and is identified as **Annex MI-005**. The requirements in this Annex are based on the OIML recommendation R117-1 which has been the pre-eminent set of guidelines for Weight & Measures for petroleum metering installations for a considerable time.

3.2.2 MID Approval Approach

One of the key changes in the Measurement Instruments Directive (MI-005) compared to previous national legislation, is that the *total metering system* is now subject to perform in the accuracy specification, and not just specific components. This means that not only the flow meter is subject to certification but also other essential parts of the metering system, such as temperature transmitters, electronic volume converters air-eliminators, and so on. In addition to this, the method with which the system is built is also examined by the Notified body. In turn the Notified Bodies are scrutinized by the European Board of Accreditation.

The system approval process for MID consists of 2 main steps:

- *'Bringing on the market'* - type-examination by a Notified body in accordance with Annex-B of the MID. This generates a so-called type-examination certificate.
- *'Putting it into use'* - conformity check of the essential parts and a wet calibration in the legal specification. This is implemented in accordance with Annex F or D of the MID. This generates the system approval.

The system can now be used for trade and excise applications. The received approval is subject to recalibration at 1 or 2 year interval, and this is determined on national level.

NOTE: Evaluation Certificate provides demonstration that the SSC as a component of a MID-compliant instrument is approved per MID and OIML requirements.

3.2.3 Component-level Requirements

For the blending applications, such as ethanol- and biodiesel-blending, the minimum required accuracy of the metering line is ±0.5% (class 0.5).

The flow metering element of the system is allowed ± 0.3% inaccuracy, and the remainder of the system is permitted to show maximum errors to ± 0.2%.

As the errors are directly related to the inaccuracies, they are added to get the total maximum. Therefore, ± 0.5% is the maximum allowed discrepancy between what the seller states as the volume transferred, and the actual volume the buyer receives.

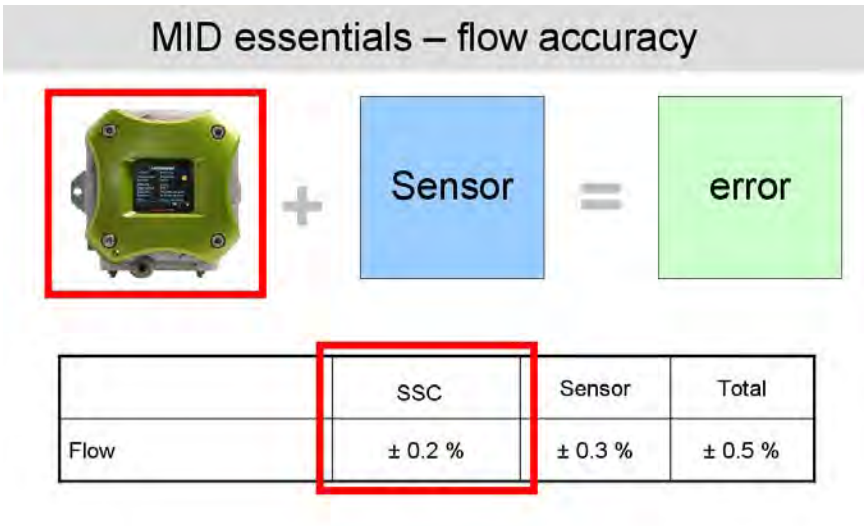
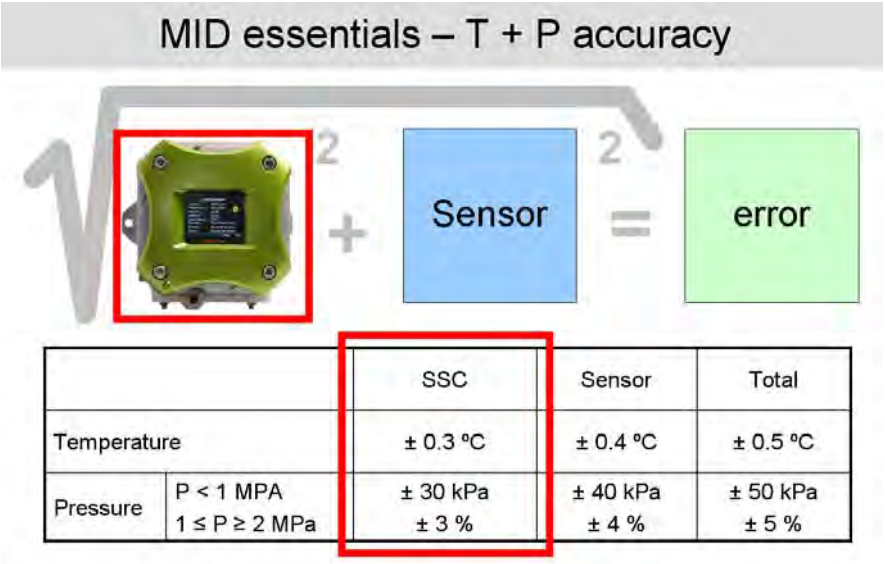


FIGURE 3-2 Component-level requirements (flow accuracy)

In the blending metering line, the essential parts of the system are the flow meter, the temperature sensor, and the blend controller itself. The flow meter physically measures the flow and generates pulses which are related to the volume passed through the meter. For reliability the pulses are dual phase shifted and are constantly checked by the electronic blend controller for integrity, according to API and ISO. Through the temperature sensor (transmitter) the metered volume can be corrected to base temperature of either 15°C (60°F) or 20°C (68°F) in accordance with ASTM standards. If a temperature transmitter is

applied then this has to have an evaluation certificate also. For the temperature sensor (Pt100) this is not required.



		SSC	Sensor	Total
Temperature		± 0.3 °C	± 0.4 °C	± 0.5 °C
Pressure	P < 1 MPA 1 ≤ P ≥ 2 MPa	± 30 kPa ± 3 %	± 40 kPa ± 4 %	± 50 kPa ± 5 %

FIGURE 3-3 Component-level requirements (Temperature and Pressure accuracy)

The blend controller evaluation is quite complex, but in principle it has to comply with the security of signal and data handling as required by MID and working documents of WELMEC.

A very stringent requirement is the EMC standard for industrial use of electronic equipment. Electro-magnetic noise might influence the measurement of the metering signal, and this is not allowed to occur outside the maximum given accuracy.

3.2.4 System-level Requirements

With any new equipment legislation such as MID, there is a raft of new issues and criteria that need to be understood by both those who are manufacturing the equipment and those who seek to utilise it. In the downstream oil & gas sector the volume of that legislation is vast. In the case of MID where the legislation crosses the boundaries of mechanical and electronic hardware, software, communications, and reconciliation and reproduction of data, correctly understanding the legislation can be particularly vexing.

For this reason the provision of “*system solutions*” is seen by many as the most efficient method of procuring equipment that is in compliance of their regulatory needs. Instead of having to understand the individual technical requisites of each individual component of a system, they only need to understand their “end game”. “I need an MID compliant ethanol

blending system" is far easier to define than specifying the individual technical specifications of each component of that system. For this to work though, the acquirer has to have confidence that the supplier is suitably knowledgeable to accurately provide them with the correct solution for their needs. The provision of a "solution" circumnavigates the minefields associated with integrating multiple components into compliant system arrangement.

Pre-configured biofuel blending systems such as the Fusion4 SSC-B do exactly this. Piecing together accurately specified MID-compliant components to provide an end-to-end solution. Combining the physical measuring element with the electronic control device and associated reconciliation options, such as digital storage or printing of BoLs. Each of these functions is required to operate under the concise guidelines laid out under MID and associated legislation such as OIML R117 and Welmec.

3.2.5 The Fusion4 SSC-B

The heart of the system is the Fusion4 SSC (single stream controller).

Founded on Honeywell Enraf's proprietary FlexConn™ architecture, the SSC is part of the Fusion4 portfolio of loading automation and control products family. A modular collection of mechanical, electronic, and software sub-systems, that can be integrated with each other to create scalable solutions.

The FlexConn™ approach has enabled Honeywell to take the well-proven functionality of its additive and blending portfolio, and bring all the options together as a single offering which is configurable to suit the end you need. Subsequently, the Fusion4 SSC incorporates 12 separate devices, each providing individual functionality, and each one configurable from 1 single device, and selectable through a license key.

The Fusion4 SSC-B's solution approach facilitates the ratification of both MID compliance steps mentioned earlier, '*bringing on the market*' and '*putting into use*', by pre-configuring all components in accordance with MID requirements, and checking conformity through pre-installation testing before delivery, as a complete system. This method not only reduces risk of non-compliance, but also speeds up the MID qualification process for the system owner.

For the owner, 'putting into use' qualification not only includes the accuracy and security of the physical operation of the blend process, but also the reconciliation and reproduction of the measurement data. Whether the information is to be stored locally on the device, distributed and stored on peripheral devices, or reconciled as a Bill of Lading print-out. For the system to be fully compliant, any of these functions must also operate in the MID criteria.

As such, the Fusion4 SSC-B offers a number of options to ensure compliance.

Firstly it implements a *large transaction storage memory of over 10,000 transactions*, which allows a device to operate for over 3 months without losing a single transaction, in standard operating conditions.

Alternatively, the SSC can have its transaction data securely downloaded through the bespoke *Fusion4 LAD* (Local Access Device). This allows the SSC to have its memory cleared in preparation for storage of another 10,000 transactions. The transactions subsequently transferred to the LAD can then be manually transferred to any peripheral system for storage or printing through secure SD card.

Finally the preferred method is to link the SSC through Comms to the *Fusion4 Portal* software package. When connected all transaction data is scanned and collected by Portal from each device. The transaction record is stored and can be printed directly or distributed through OPC to 3rd party systems for separate reconciliation.

The *Fusion4 Portal BoL Print facility is fully MID compliant*, and therefore can facilitate a stand alone blending infrastructure that meets all MID requirements. Along with MID print functionality and OPC capability, bolt on modules for the Portal software suite also include remote configuration, remote event monitoring and alarm handling and advanced LAD interaction tools.

3.3 System Architecture

Founded on Honeywell Enraf's proprietary FlexConn architecture, the SSC-B is a member of the Fusion4 portfolio of Loading Automation & Control products.

The Fusion4 SSC-B system is built up from interchangeable hardware modules. These modules consist of uniform PCBs (printed circuit boards), each of them representing a different, unique functionality. Together with the software implemented on these hardware parts, each PCB makes up a FlexConn module. These modules communicate with each other through the serial CAN-bus. See FIGURE 3-4.

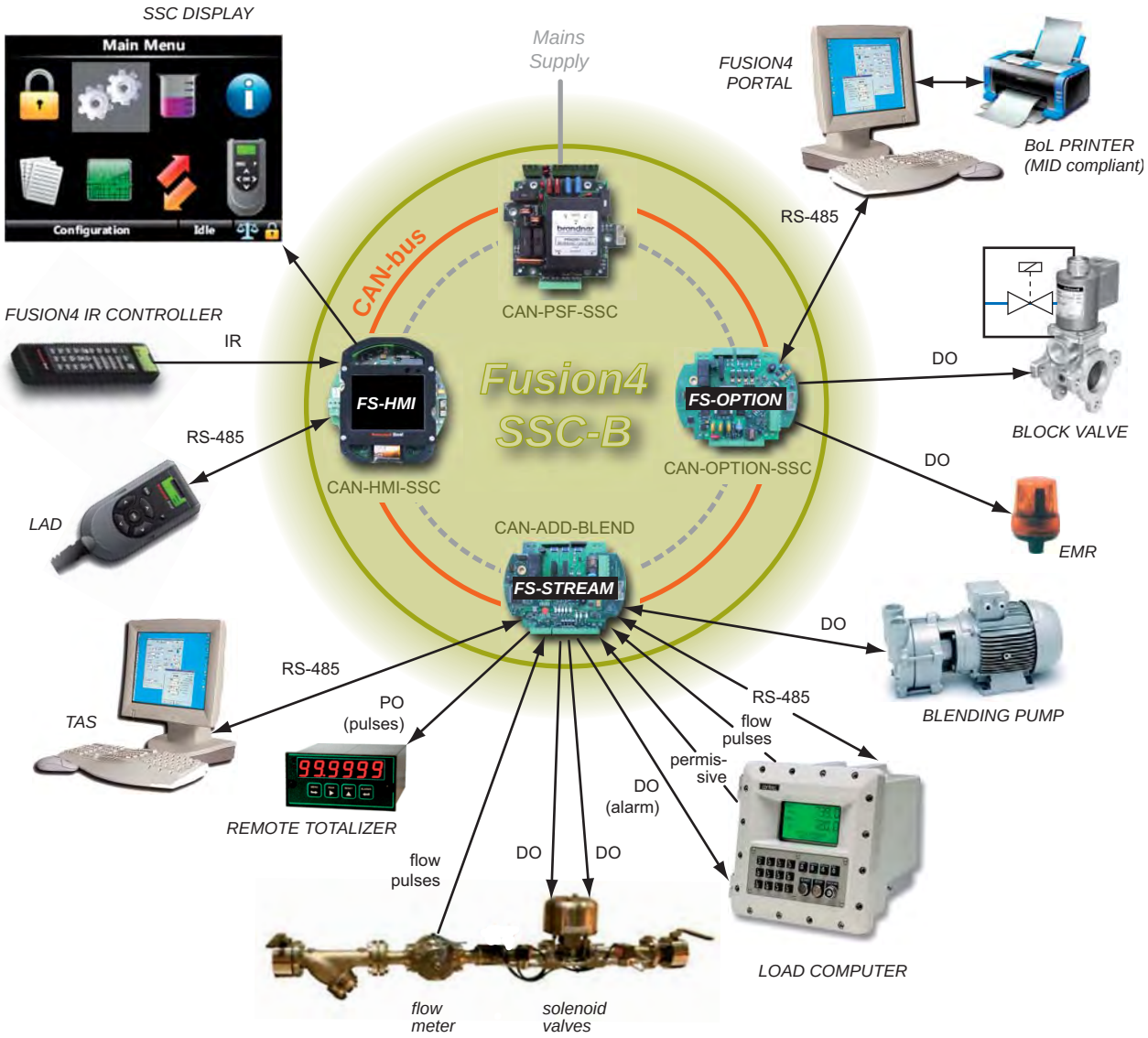


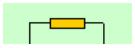
FIGURE 3-4 Fusion4 SSC-B architecture overview

F4A10-0004

3.4 FlexConn Modules

3.4.1 General

One of the main characteristics of the FlexConn architecture is its placement flexibility of the FlexConn modules. The backbone of this concept is the serial CAN[1] bus to which each FlexConn module connects.



= terminating resistor

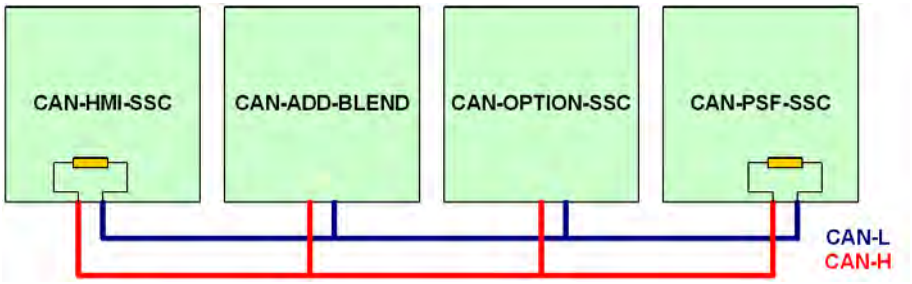


FIGURE 3-5 FlexConn CAN bus concept

Besides a *generic* function, each FlexConn module has one or more *specific* functions. In general, this can be:

- a sensor function
- an application function
- an input/output (I/O) function
- a communication function
- a display function

A *sensor* function measures or calculates a process value, or it obtains a process value from a connected external instrument.

An *application function* controlling the high-level operation of a device, for instance stream control, flow control, or device control.

An *input/output (I/O)* function controls digital output or reads digital input from external instruments.

A *communication* function takes care of the communication with a communication interface unit or with a DCS, SCADA, tank inventory, or another terminal automation system.

A *display function* makes it possible to communicate with the module(s) through a Human Machine Interface.

1. Controller Area Network.

3.5 Hardware Structure

3.5.1 Housing

The housing of the SSC-B consists of a box and a lid, which can be removed by loosening 4 captive socket-head screws. See FIGURE 3-6.

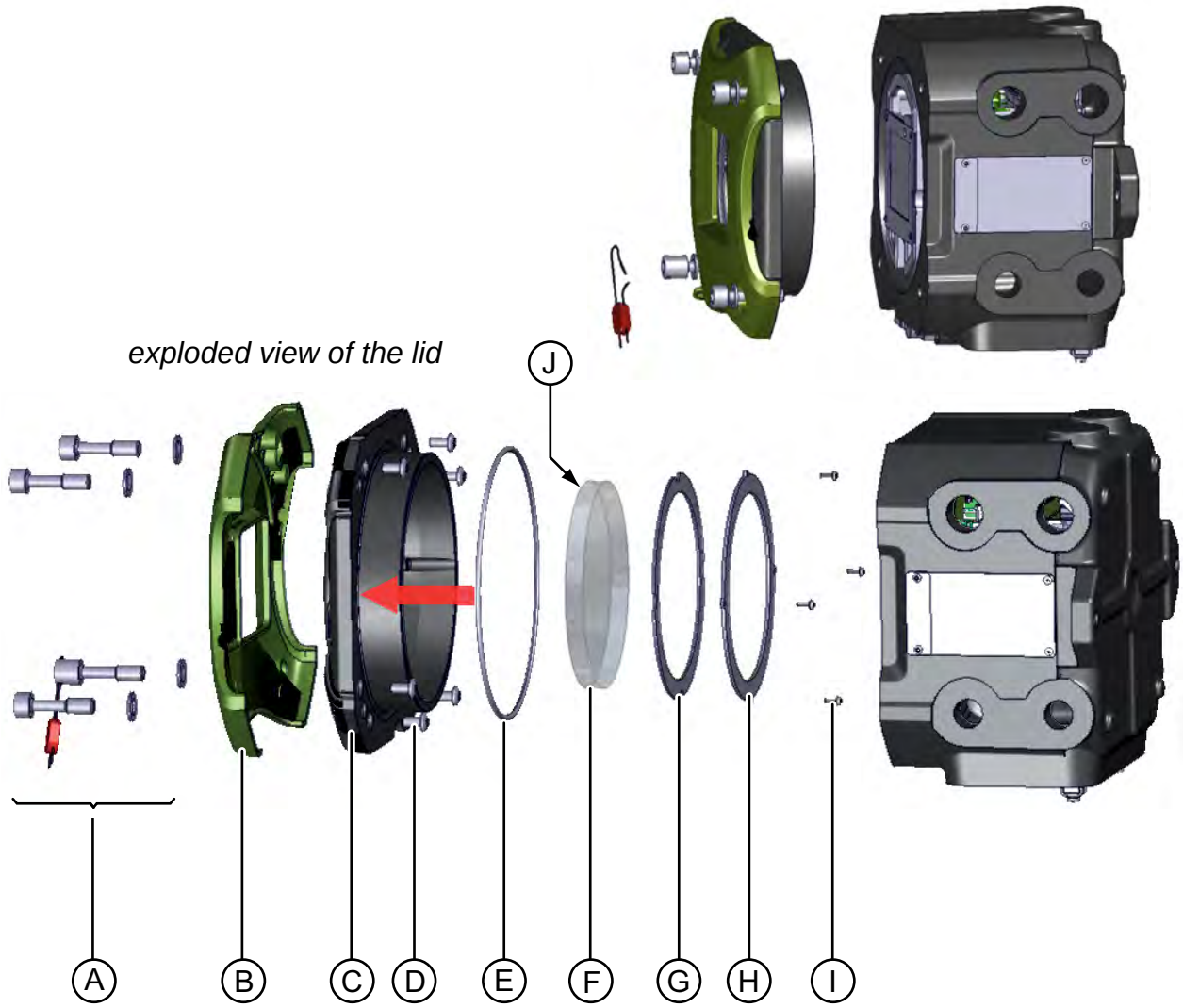


FIGURE 3-6 Housing of SSC-B

Label	Description
A	Captive socket-head screws (4x), of which 1 has an enlarged head for sealing purposes (see figure left)
B	Brand identity cover
C	Lid
D	Brand identity cover fasteners (6x)
E	O-ring (standard available part)
F	Glass
G/H	Glass retainer rings
I	Glass retainer rings fasteners (4x)
J	Glass cemented to lid (C) on this side (circular, contact surface)

3.5.2 Interior

- In the rugged, sand-casted housing, the printed circuit boards of the SSC-B are stacked by means of plastic board-retaining clips.
- The metal board spacers provide extra stability, grounding, and EMI performance.
- The boards are interconnected by a flatcable, providing power and serial communication.

- The SSC-B version without CAN-OPTION-SSC has 4 extra mounting studs to compensate for the reduced board assembly height. See FIGURE 3-7.

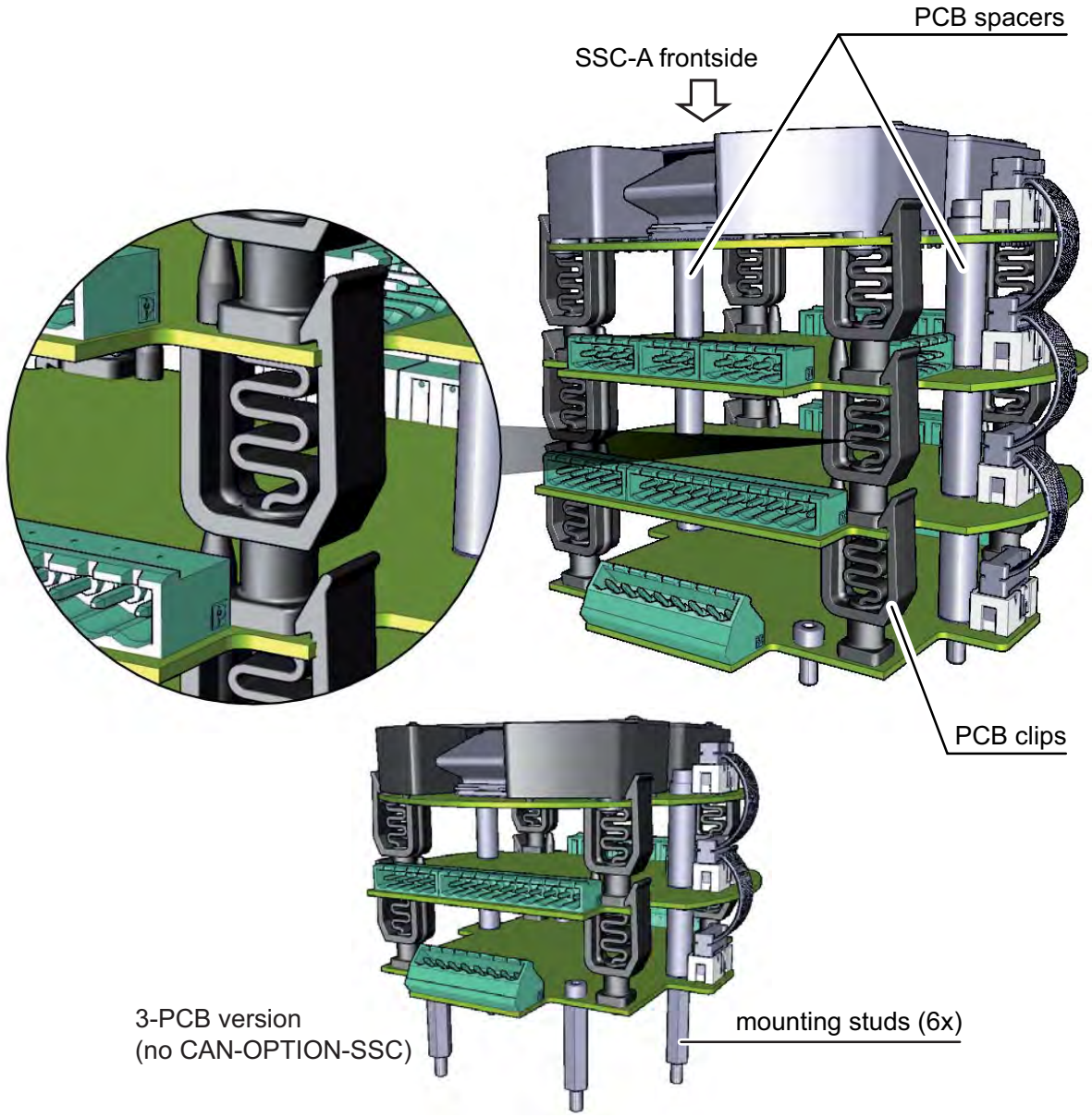


FIGURE 3-7 Stacked module construction of the SSC-B F4A10-0006

The following boards can be placed into the SSC-B:

- CAN-HMI-SSC
- CAN-OPTION-SSC
- CAN-ADD-BLEND
- CAN-PSF-SSC

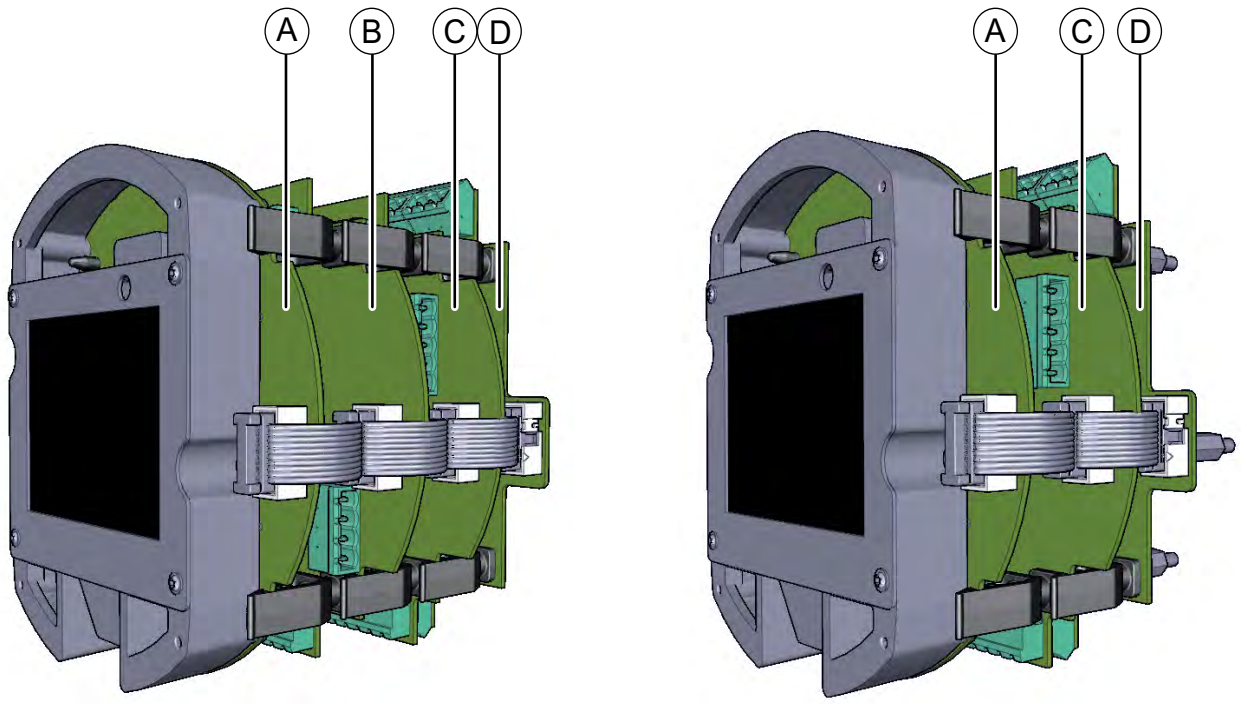


FIGURE 3-8 Full-configuration SSC-B (left) and 3-PCBs configuration (right)

F4A10-0005

Refer to FIGURE 3-8	PCB name	Module* name	Description
A	CAN-HMI-SSC	FS-HMI	Controls the display and the LAD (Local Access Device) interfaces.
B	CAN-OPTION-SSC	FS-OPTION	Additional IO functions are available with this optional board.
C	CAN-ADD-BLEND	FS-STREAM	Controls the blend stream.
D	CAN-PSF-SSC	-	Delivers the internal power for the SSC-B.

* A PCB with software installed.

3.5.3 Grounding Concept

Each printed circuit board has 2 grounding points. These grounding points are used to electrically connect every board with the metal housing. This is done by means of metal spacers, which are pressed into the boards. See FIGURE 3-9.

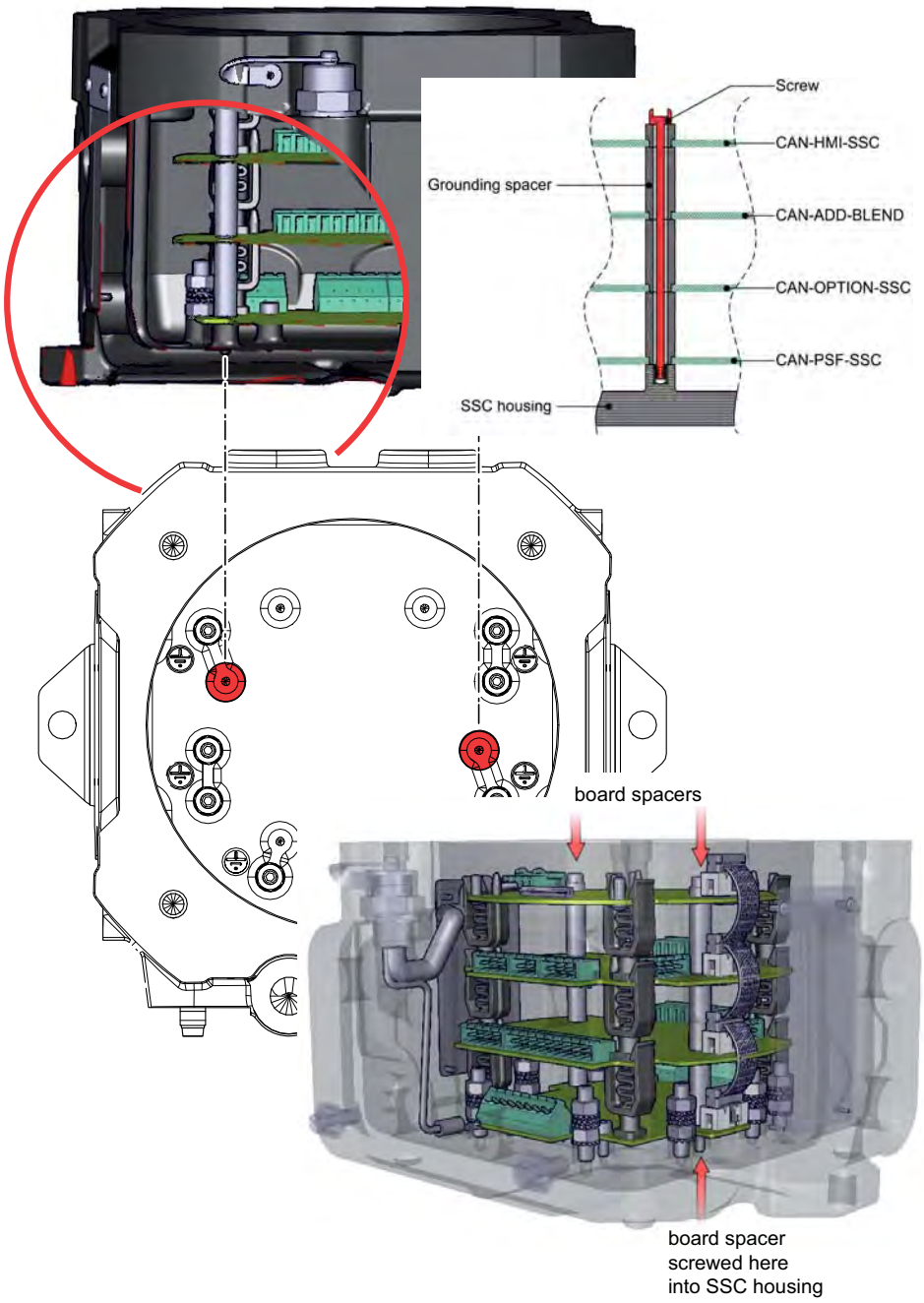


FIGURE 3-9 Grounding concept (1)

The internal electronics (that is, processing) are directly connected with this ground. All galvanic isolated IO blocks are not connected with this ground to have a proper EMC separation. See FIGURE 3-10 for a visualization of this concept.

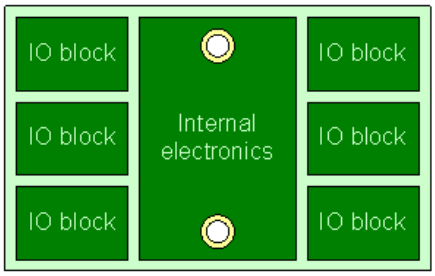


FIGURE 3-10 Grounding concept (2)

3.6 PCB Layout

Each FlexConn PCB consists of a *generic* and a *specific* electronics part. The *generic* part can be found on any FlexConn modules. The *specific* electronics part represents an application-specific function. On the *generic* electronics part, the following parts can be found:

- **The program memory** contains the module-specific software.
- **The microprocessor / controller** executes the module-specific software stored in the program memory.
- When the power is switched off, the commissioning parameters and the diagnostics data are stored in **the non-volatile memory**.
- With **jumpers**, specific hardware settings can be made.
- The **Health LED (blue)** indicates the general health status of the FlexConn module:

Health Status	Flashing Pattern
Good	●○○○○○○○○○○○●○○○○○○○
Uncertain	●○●○●○○○○○○●○●○●○○○○○
Bad	●○●○●○●○●○●○●○●○●○●○●

- The **Function LEDs** indicate module-specific activities, such as data being transmitted or received.
- **Voltage monitors and temperature sensors** are used for internal diagnostics purposes.

3.6.1 PCB Details

3.6.1.1 CAN-HMI-SSC

3.6.1.1.1 Functions

This board realizes the interface between the device and the user (HMI = Human Machine Interface). It also controls and manages the information about the blend process and transaction-related data.

The board implements the following functions:

Function	Description
Display control interface	Control and interface of the 3.5” QVGA color display
Record storage	Data storage of transactions, calibrations, and alarms
Display processor	Messages processing
IR interface	Fusion4 IR Controller interface
LAD Ex i interface	Intrinsically safe (Ex i) interface for the Local Access Device
RTC	Real Time Clock. Used for date and time stamping of transaction data.

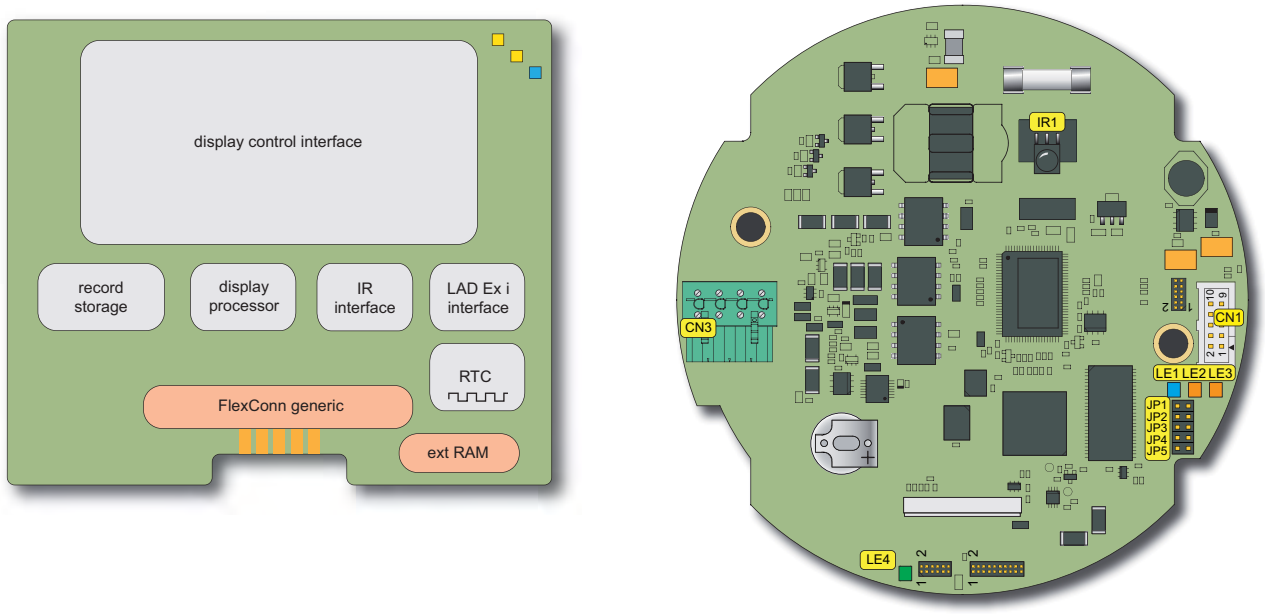


FIGURE 3-11 CAN-HMI-SSC functions (left) and physical layout (right)

3.6.1.1.2 *Component Locations*

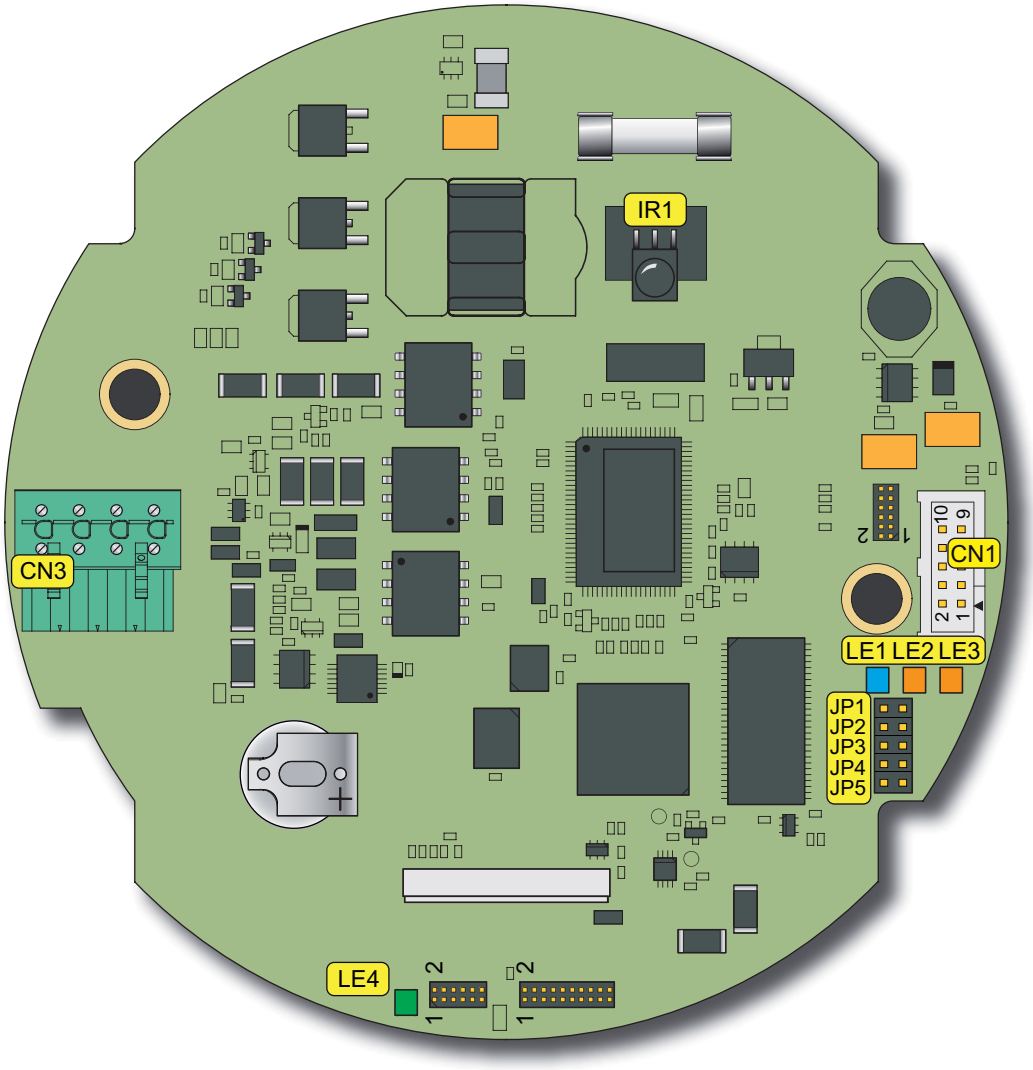
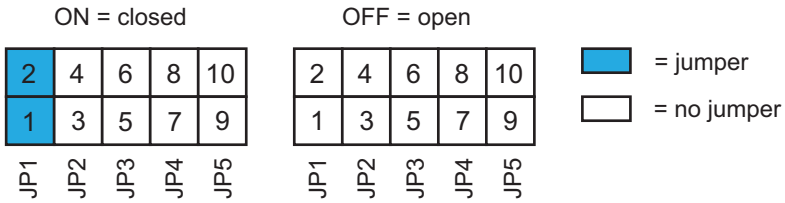


FIGURE 3-12 CAN-HMI-SSC component location

Item reference	Description
JP1 ... 5	FlexConn jumpers
JP1	**W&M seal** *NOTE Setting the W&M jumper on one of the SSC boards makes the W&M sealing effective for all boards.*
CN3	Ex i connector (connects PCB to the LAD connector in the enclosure)
LE1	FlexConn Health LED
LE2	Inter processor activity
LE3	CAN bus activity
LE4	HMI processor LED (LAD activity)
IR1	Infrared receiver for Fusion4 IR Controller

3.6.1.1.3 *Terminal Descriptions*

■ JP1 ... 5



Name	State	Description
JP1	ON (closed)	Connected to ground (GND) --> logical '1'
JP1	OFF (open)	Active low signal to the processor. Pulled up to have a '0'.

■ CN3 - LAD connector

Pin no.	Name / signal	Description
1	GND_{safe}	Ex i safe ground
2	V_{safe}	Ex i safe power
3	A_{safe}	Ex i safe RS485 A signal
4	B_{safe}	Ex i safe RS485 B signal

WARNING! Leaving the wiring to this connector loose (unconnected) inside the SSC creates an explosion risk! Unsafe (non-intrinsically safe) power might be connected to the LAD as a result.

3.6.1.2 CAN-ADD-BLEND

3.6.1.2.1 Functions

This board takes care of the blend-stream metering and the solenoid control, and also contains the blending algorithms.

The physical board implements the following functions:

Function	Description
2 Digital Input AC (**DI AC**) circuits	Convert high-voltage switched AC signals into isolated logic signals.
2 Digital Input DC (**DI DC**) circuits	Convert switched DC signals into isolated logic signals.
Single-Pulse Input (**Single PI**) circuit	Accepts pulses from wild or main stream source (flow meter).
Dual-Pulse Input (**Quad PI**) circuit	Accepts pulses from blend flow meter.
2 Digital Output Solid State Relay AC (**DO AC**) circuits	Convert the logic signals from the FlexConn generic microcontroller into isolated, high-voltage rated switched AC signals.
2 Digital Output Pulse Output (**PO DC**) circuits	Convert the logic signals from the FlexConn generic microcontroller into isolated, high-frequency switched DC signals.
A Digital Output Electromechanical Relay (**DO EMR**) circuit	Converts the logic signals from the FlexConn generic microcontroller such that higher power AC or DC signals can be switched.
A **COMMS** circuit	This RS serial communication block, which can be configured as 2-wire or 4-wire circuit, allows the SSC to communicate with external devices through an RS-485 compliant connection.

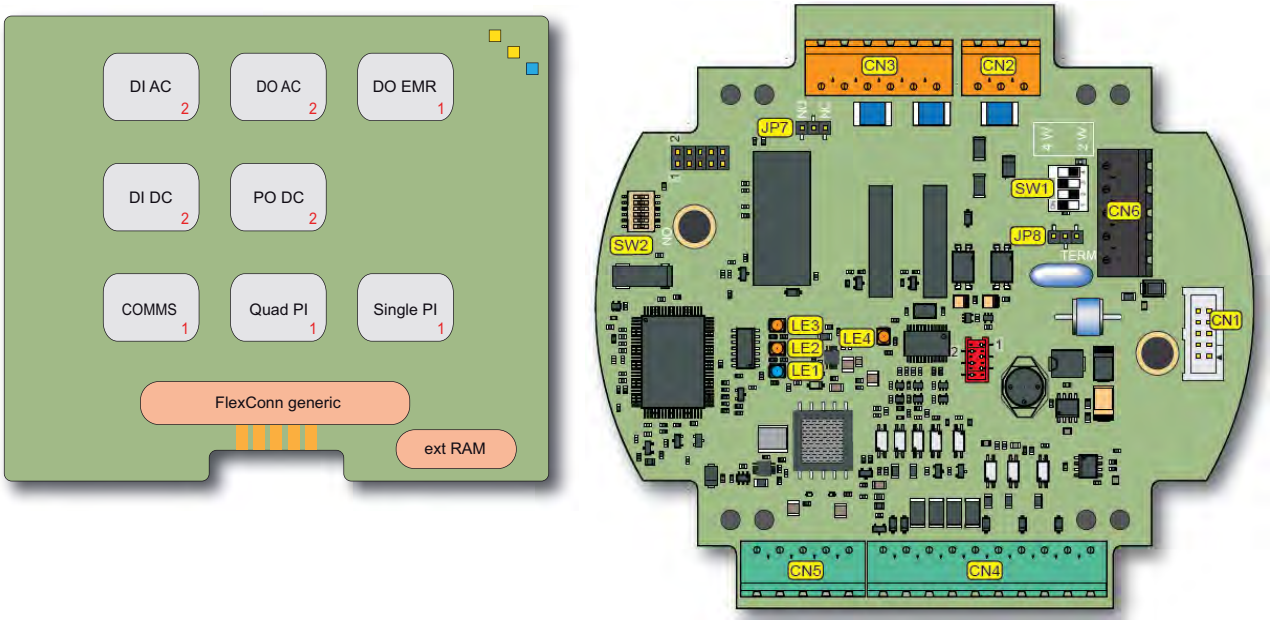


FIGURE 3-13 CAN-ADD-BLEND functions (left) and physical layout (right)

3.6.1.2.2 Components Locations

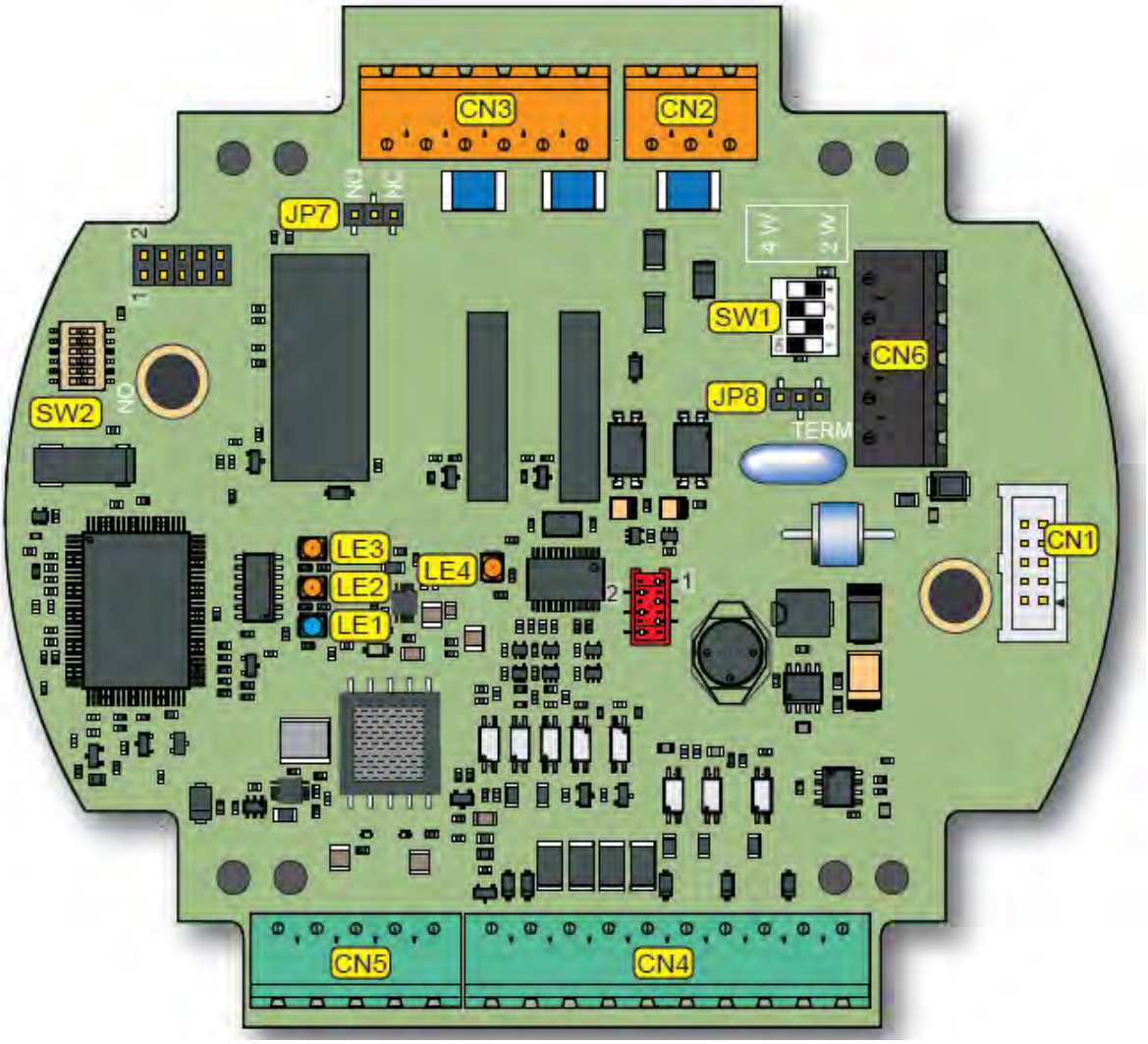
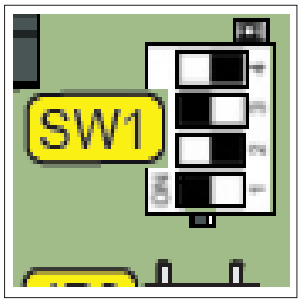


FIGURE 3-14 CAN-ADD-BLEND component location

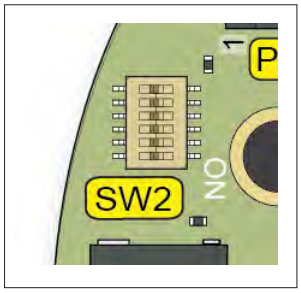
Item reference	Description
SW1	RS-COMM mode switch
SW2	FlexConn jumper function switches
JP7	Jumper for Digital Output ElectroMechanical Relay contacts setting
JP8	Jumper for RS communication termination setting
LE1	FlexConn Health LED
LE2	Function configurable
LE3	Function configurable
LE4	Pulse Input activity
For all connectors: see 4.9.3 - Board Connectors Overview.	

3.6.1.2.3 Terminal Descriptions



■ SW1 - RS-COMM mode switch

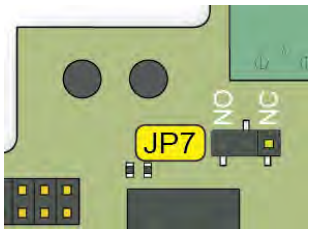
Reference	Setting	Function	Description
SW1-1	ON	2-Wire interface	2-Wire RS-485 communication
SW1-2	OFF		
SW1-3	ON		
SW1-4	OFF		
SW1-1	OFF	4-Wire interface	4-Wire RS-485 communication
SW1-2	ON		
SW1-3	OFF		
SW1-4	ON		

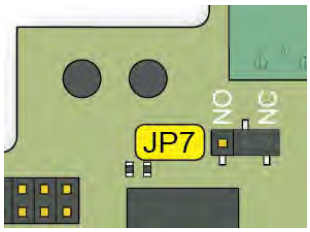


■ SW2 - FlexConn jumper function switches

Reference	Jumper name	Function when set to ON
SW2-1	FlexConn JP1	**W&M entities protection (not relevant for SSC-A)**
SW2-2	FlexConn JP2	Password read protection
SW2-3	FlexConn JP3	Write protection all entities
SW2-4	FlexConn JP4	Spare
SW2-5	FlexConn JP5	Spare
SW2-6	FlexConn JP6	CAN bus termination

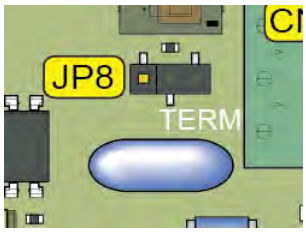
■ JP7 - Jumper for Digital Output EM Relay contacts setting

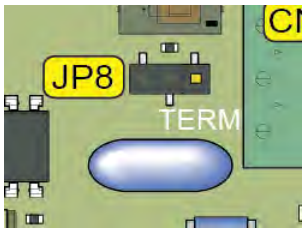




Position	Description
NO (figure left)	Relay contacts normally open
NC (figure right)	Relay contacts normally closed

- JP8 - Jumper for RS communication terminating setting





Position	Description
TERM (figure left)	RS-485 communication terminated with 120 Ω
- (figure right)	RS-485 communication NOT terminated

3.6.1.3 CAN-OPTION-SSC

3.6.1.3.1 Functions

This board provides additional options that could be needed for a specific customer application. The physical board implements the following functions:

Function	Description
4 Digital Input AC (**OPT DI AC**) circuits	Convert high-voltage switched AC signals into isolated logic signals.
Digital Output Solid State Relay AC (**OPT DO AC**) circuit	Converts the logic signals from the FlexConn generic microcontroller into isolated, high-voltage rated switched AC signals.
Digital Output Electromechanical Relay (**OPT DO EMR**) circuit	Converts the logic signals from the FlexConn generic microcontroller such that higher power AC or DC signals can be switched.
2-wire passive or active isolated 4-20 mA receiver circuit block (**OPT AI DC**)	Converts 4-20 mA current loop signals (over long distances) from external sources, such as temperature or pressure sensors into numeric values. It can be configured to active or passive mode.
2-wire passive isolated 4-20 mA transmitter circuit (**OPT AO DC**)	Converts logic signals into 4-20 mA current loop signals (over long distances) to control external devices, such as a valve, or to transmit liquid flow rates, and so on.
Resistance Temperature Detector (**OPT RTD**)	Converts temperature data from a remotely connected PT100 resistance temperature detector into a resistance value that can be read by the FlexConn microcontroller.
2-wire isolated **OPT COMMS** circuit	This 2-wire RS serial communication block allows the SSC to communicate with external devices through an RS-485 connection.
2 Digital Input DC (**OPT DI DC**) circuits	Convert switched DC signals into isolated digital logic signals.

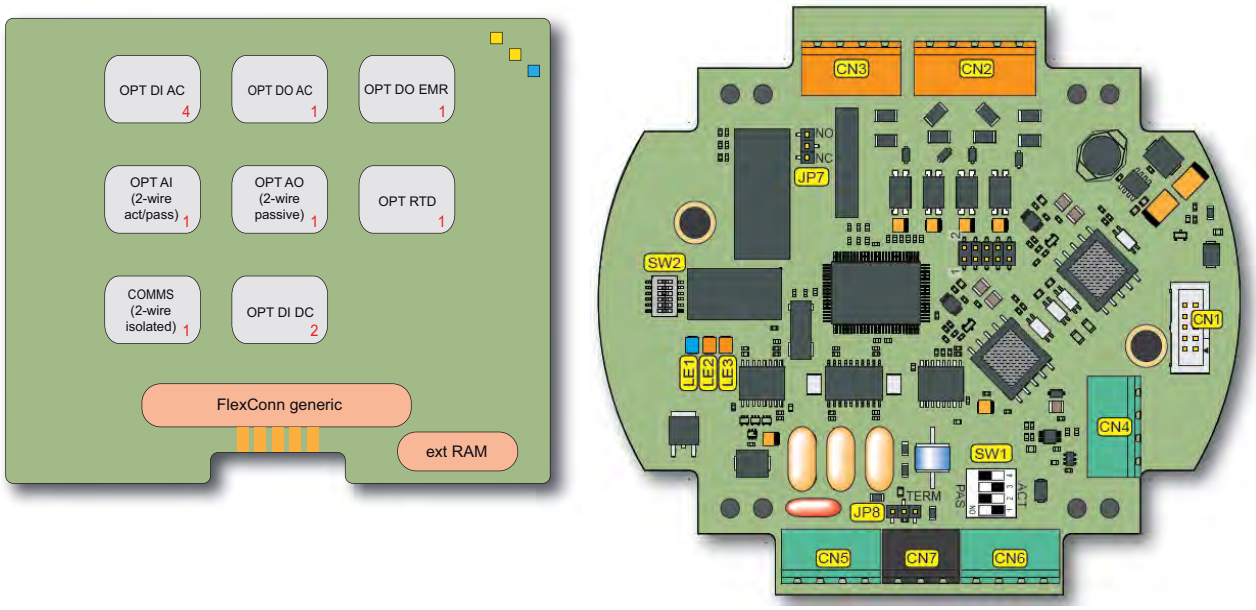


FIGURE 3-15 CAN-OPTION-SSC functions (left) and physical layout (right)

3.6.1.3.2 Component Locations

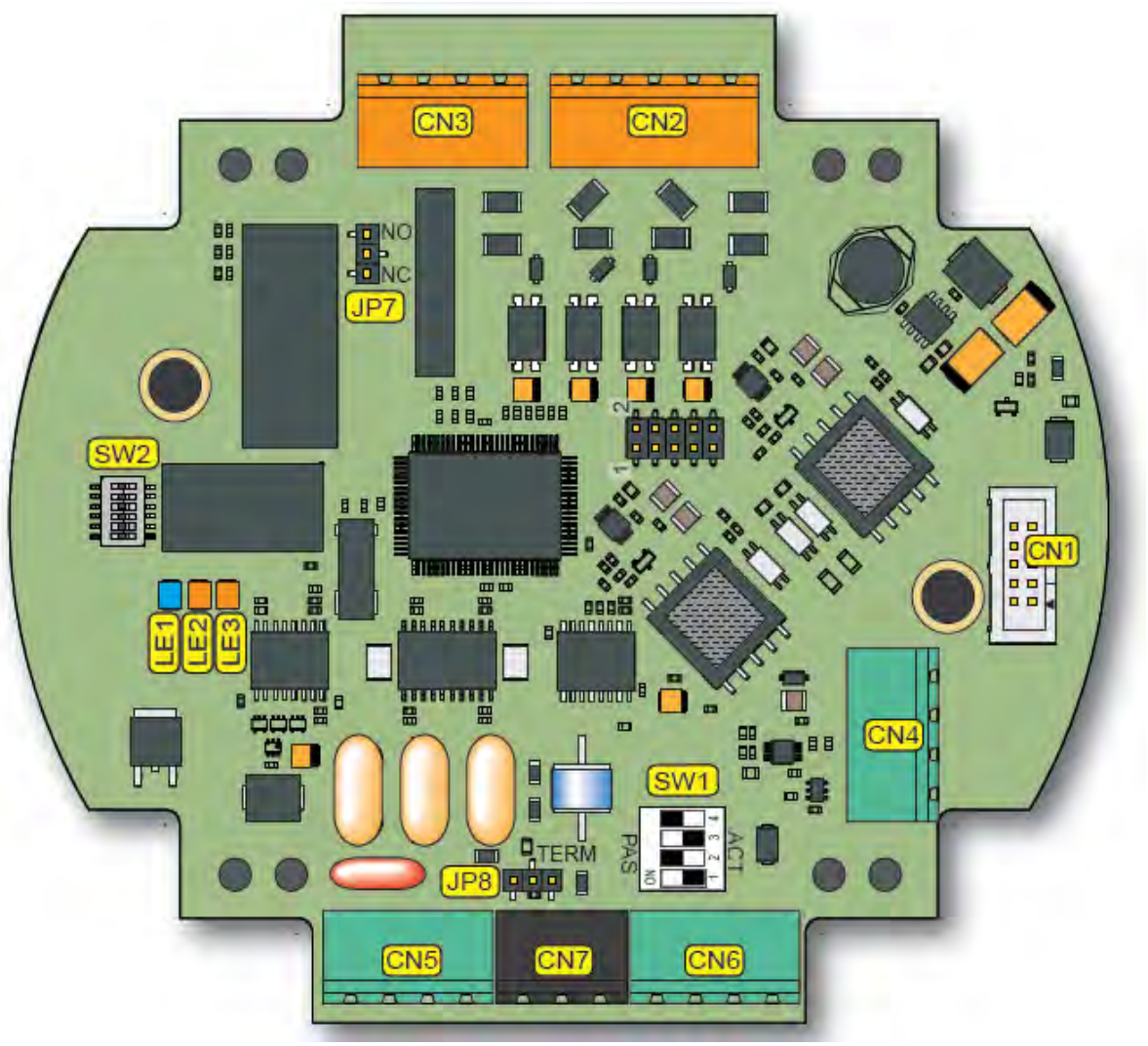
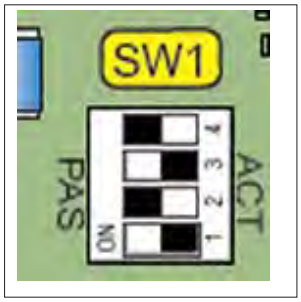


FIGURE 3-16 CAN-OPTION-SSC component location

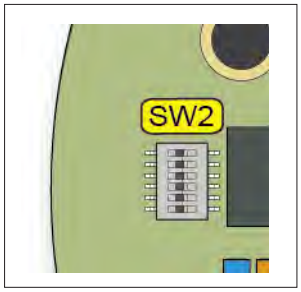
Item reference	Description
SW1	Active Input mode switch
SW2	FlexConn jumper function switches
JP7	Jumper for Digital Output ElectroMechanical Relay contacts setting
JP8	Jumper for RS communication termination setting
LE1	FlexConn Health LED
LE2	Function configurable
LE3	Function configurable
For all connectors: see 4.9.3 - Board Connectors Overview.	

3.6.1.3.3 *Terminal Descriptions*



■ SW1 - Analog Input mode switch

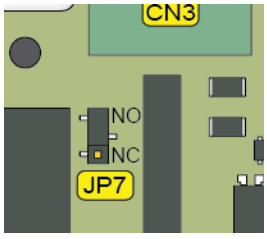
Reference	Setting	Function	Description
SW1-1	ON	Active Mode	4-20 mA input loop powered from CAD-ADD-BLEND board
SW1-2	OFF		
SW1-3	ON		
SW1-4	OFF		
SW1-1	OFF	Passive	4-20 mA input loop powered from external power supply
SW1-2	ON		
SW1-3	OFF		
SW1-4	ON		

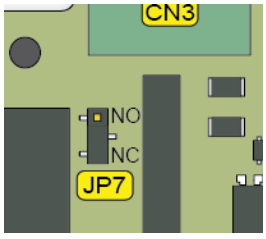


■ SW2 - FlexConn jumper function switches

Reference	Jumper name	Function when set to ON
SW2-1	FlexConn JP1	**W&M seal (setting effective for all SSC boards)**
SW2-2	FlexConn JP2	Password read protection
SW2-3	FlexConn JP3	Write protection all entities
SW2-4	FlexConn JP4	Spare
SW2-5	FlexConn JP5	Spare
SW2-6	FlexConn JP6	CAN bus termination

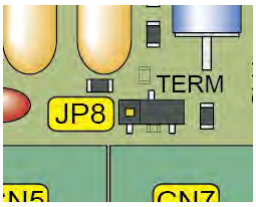
■ JP7 - Jumper for Digital Output EM Relay contacts setting

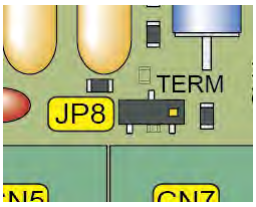




Position	Description
NO (figure left)	Relay contacts normally open
NC (figure right)	Relay contacts normally closed

- JP8 - Jumper for RS communication terminating setting





Position	Description
TERM (figure left)	RS-485 communication terminated with 120 Ω
- (figure right)	RS-485 communication NOT terminated

3.6.1.4 CAN-PSF-SSC

3.6.1.4.1 Functions

The primary function of the CAN-PSF-SSC board is to convert single phase AC mains voltage into a DC voltage, to power the other SSC modules. It can also deliver fuse-protected AC power for *external* devices, such as blend control valves. It can also provide DC power for external devices, such as flow meters, temperature sensors, and so on. See FIGURE 3-17.

The CAN-PSF-SSC board also provides AC power for the DO AC on both the CAN-ADD-BLEND and CAN-OPTION-SSC boards.

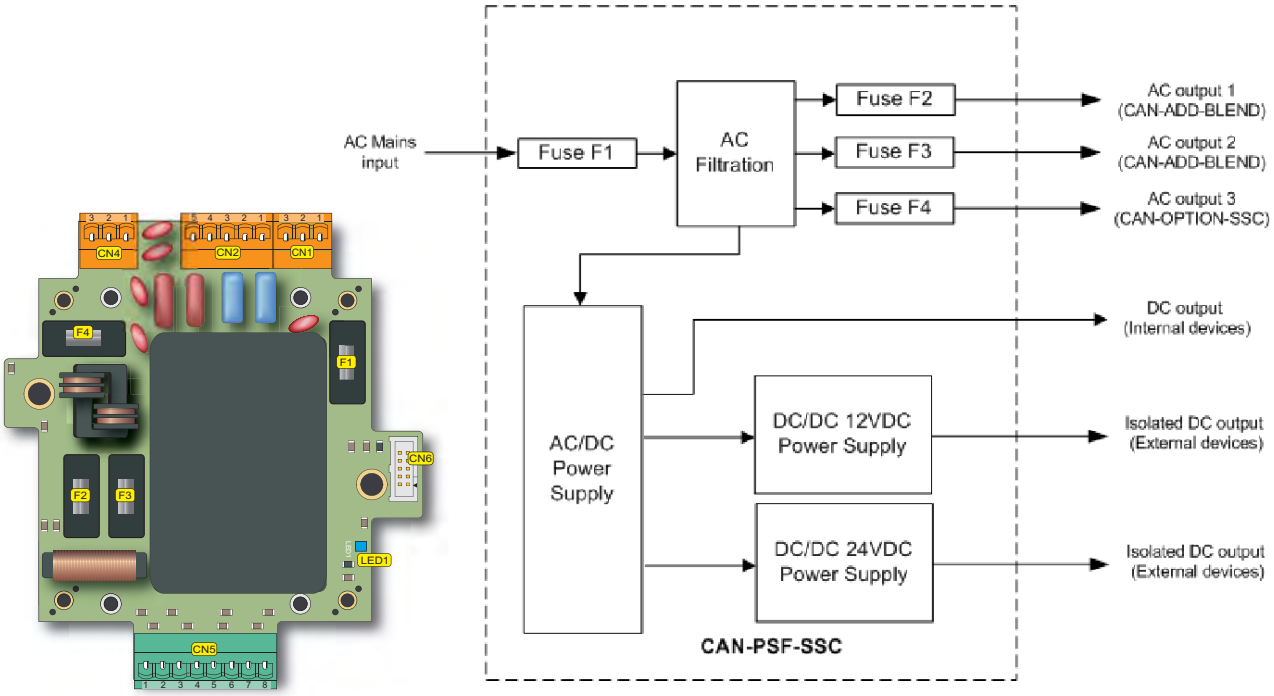


FIGURE 3-17 CAN-PSF-SSC functions (right) and physical layout (left)

The following table specifies the external DC outputs.

Item	Conditions	Minimum	Typical	Maximum	Unit
Output voltage variation	V_{in} = 230 V_{AC}	23 11.5	24 12	25 12.8	V_{DC}
Continuous output current	+24 V_{DC} +12 V_{DC}	-	-	42 83	mA
Short circuit current	+24 V_{DC} +12 V_{DC}	42 83	56.3 94	80 110	mA
Ripple and noise	pk-pk bandwidth = 20 Mhz	-	-	150	mV

Four distinct fuses are used on the CAN-PSF board. F1 provides protection for all AC voltages either used by the AC-DC converters or used as a pass-through supply voltage for external devices. F2 and F3 is used for the CAN-ADD-BLEND board external devices. F4 is used for the CAN-OPTION board external devices.

3.6.1.4.2 Board Description

3.6.1.4.3 TComponents Locations

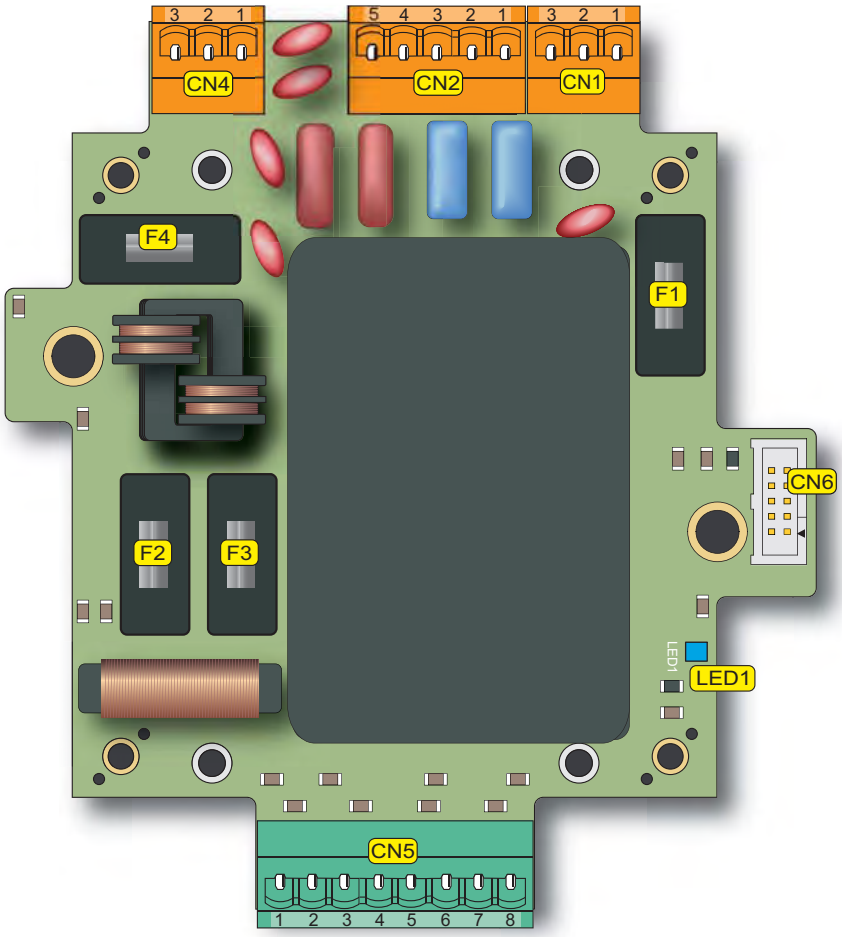


FIGURE 3-18 CAN-PSF-SSC component location

Item reference	Description	Remark
F1	4A (T) fuse - size 5x20 mm - high-breaking capacity	AC Input for the CAN-PSF-SSC
F2	1.5A (T) fuse - size 5x20 mm	AC Output for the CAN-ADD-BLEND
F3	1.5A (T) fuse - size 5x20 mm	AC Output for the CAN-ADD-BLEND
F4	1.5A (T) fuse - size 5x20 mm	AC Output for the CAN-OPTION-SSC
LED1	FlexConn Health LED	

Item reference	Description	Remark
For all connectors: see 4.9.3 - Board Connectors Overview.		

3.7 Device Features

3.7.1 Mechanical

- Mounting facilities: 229 mm [9.016 inches] spacing, and allowing M10 fixing bolts (see FIGURE 3-19).

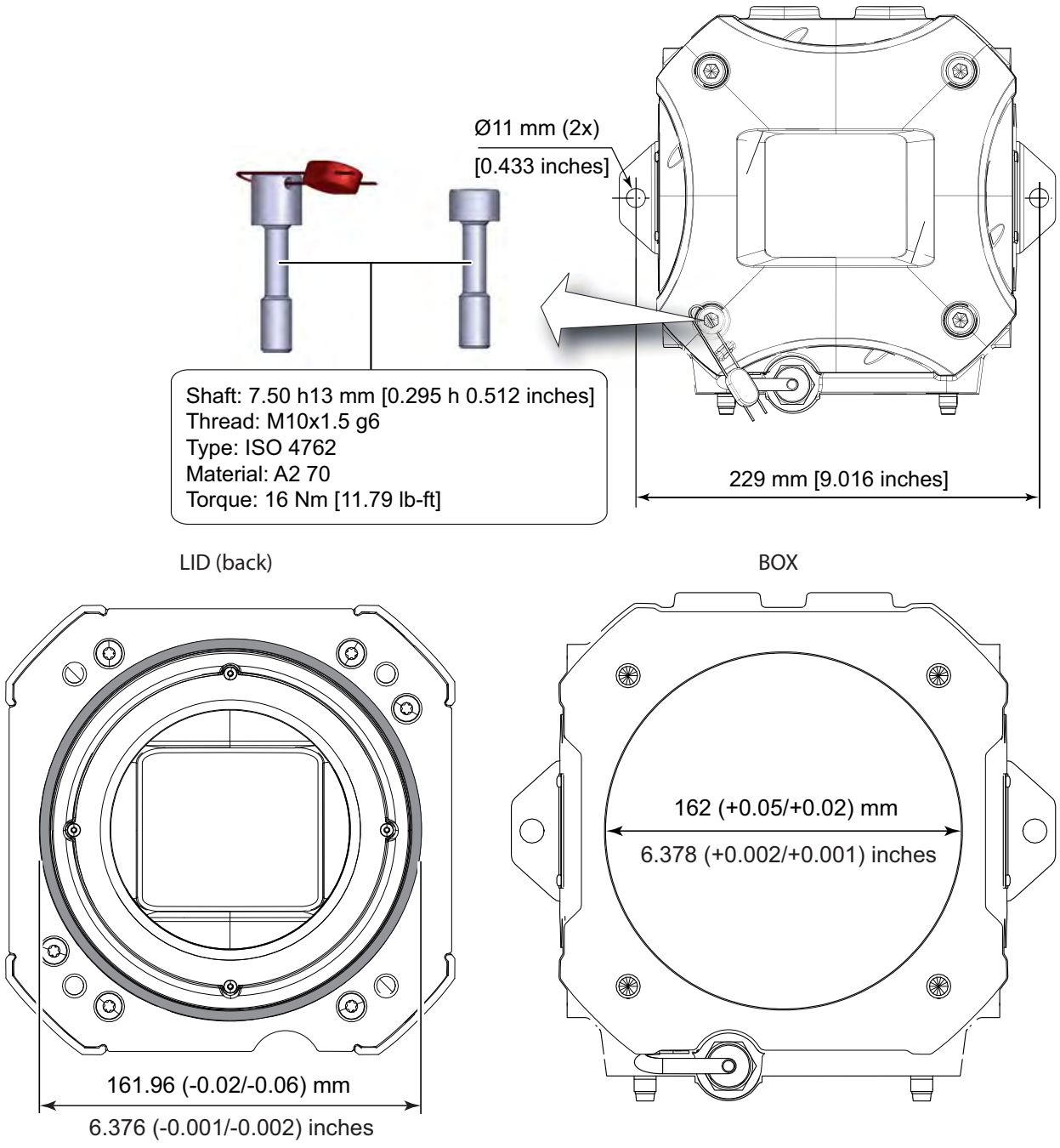


FIGURE 3-19 Mechanical facilities of SSC-B

- Captured bolts in lid

- Sealing facility on the lid (see FIGURE 3-20)

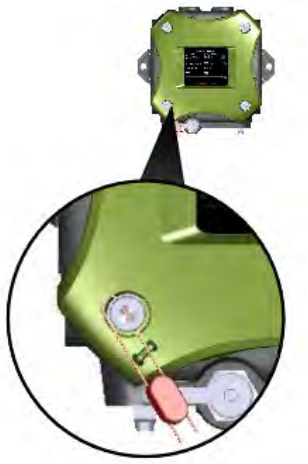


FIGURE 3-20 Sealing facility on the SSC-B lid

- Sealing bolt for physical device sealing
- Optional tag plate to be mounted on the enclosure
- O-ring in lid, standard available part
- Intrinsically safe interface connector for the LAD
- Metric or NPT cable entries
- Optional breather/drain
- Glass window for display and IR interface for IR remote

3.7.2 Electrical

- Internal power supply

- External (2) and internal (8) ground points (see FIGURE 3-21).

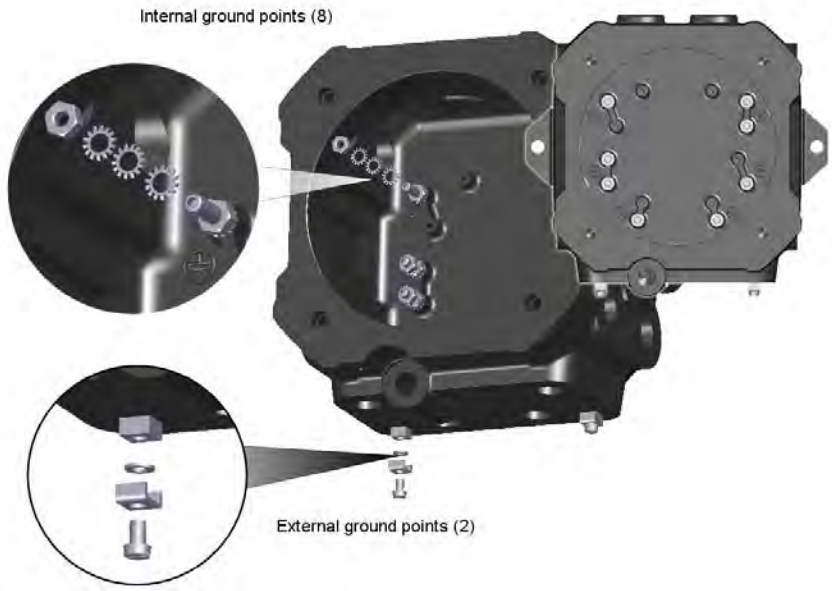


FIGURE 3-21 Internal power supply of SSC-B

- 3 Internal fuses
- 3 Microprocessor-controlled modules
- Each IO galvanically isolated from internal electronics and from each other (Safety performance)

3.7.3 System

- Full-color (16 bits) QVGA 320*240 display, 3.5” diagonal
- Multi-language support for main screens:
  - English US
  - English UK
  - French
  - German
  - Spanish
  - Dutch
  - Italian
  - Portuguese
  - Chinese
  - Japanese
  - Polish
  - one additional configurable user language (Latin char. set)
- Menu-driven service interface:
  - LAD intrinsic safe interface

- IR interface, compatible with the actual Honeywell Enraf Fusion4 IR Controller

- Real-time clock used for time stamping
- 2 Communication ports for interfacing with safe-area tools and systems

3.7.4 Environment

Parameter	SSC	LAD
Operating temperature	-40°C ... +65°C (-40ºF ... +149ºF)	-20°C ... +65°C (-4ºF ... +149ºF)
Electronics designed for	-40°C ... +85°C (-40ºF ... +185ºF) and RoHS[1]	-40°C ... +85°C (-40ºF ... +185ºF) and RoHS[1]
Storage temperature	-40°C ... +85°C (-40ºF ... +185ºF)	-40°C ... +85°C (-40ºF ... +185ºF)
Ingress protection	IP66 / NEMA 4X	IP54 / NEMA 3R
SD-card compartment behind lid	-	IP20

1 Restriction of Hazardous Substances.

3.8 Available Input/Output Functions on the SSC-B

I/O block	CAN-ADD-BLEND	CAN-OPTION-SSC	Refer to section
Dual-Pulse Input (Quad PI)	1	-	3.9.5
Single-Pulse Input (Single PI)	1	-	3.9.4
Analog Input (OPT AI DC)	-	1	3.9.6
Analog Output (OPT AO DC)	-	1	3.10.5
Resistance Temp. Detector (OPT RTD)	-	1	3.9.7
Communication (COMMS/ OPT COMS)	RS-485	RS-485	3.11.1
Pulse Output (PO DC)	2	-	3.10.4
Digital Input DC (DI DC/ OPT DI DC)	2	2	3.9.3
Digital Input AC (DI AC/ OPT DI AC)	2	4	3.9.2
Digital Output Electromechanical Relay (DO EMR/ OPT DO EMR)	1	1	3.10.3
Digital Output Solid State Relay AC (DO AC/ OPT DO AC)	2	1	3.10.2

For the configuration of these I/O functions, see *Chapter 5 - Operation*.

3.9 Input Functions

3.9.1 General

The SSC supports the electronic input functions as follows.

Input function	I/O block name	
	CAN-ADD-BLEND	CAN-OPTION-SSC
Digital Input AC	DI AC	OPT DI AC
Digital Input DC	DI DC	OPT DI DC
Single Pulse Input	Single PI	-
Dual Pulse Input	Quad PI	-
Analog Input	-	OPT AI DC
Resistance Temperature Detector	-	OPT RTD

3.9.2 Digital Input AC (DI AC/ OPT DI AC)

3.9.2.1 Functional Description

The function of the Digital Input AC is to convert high-voltage switched AC into a signal that can be used by the controller to realize specific functionality needed for the customer application.

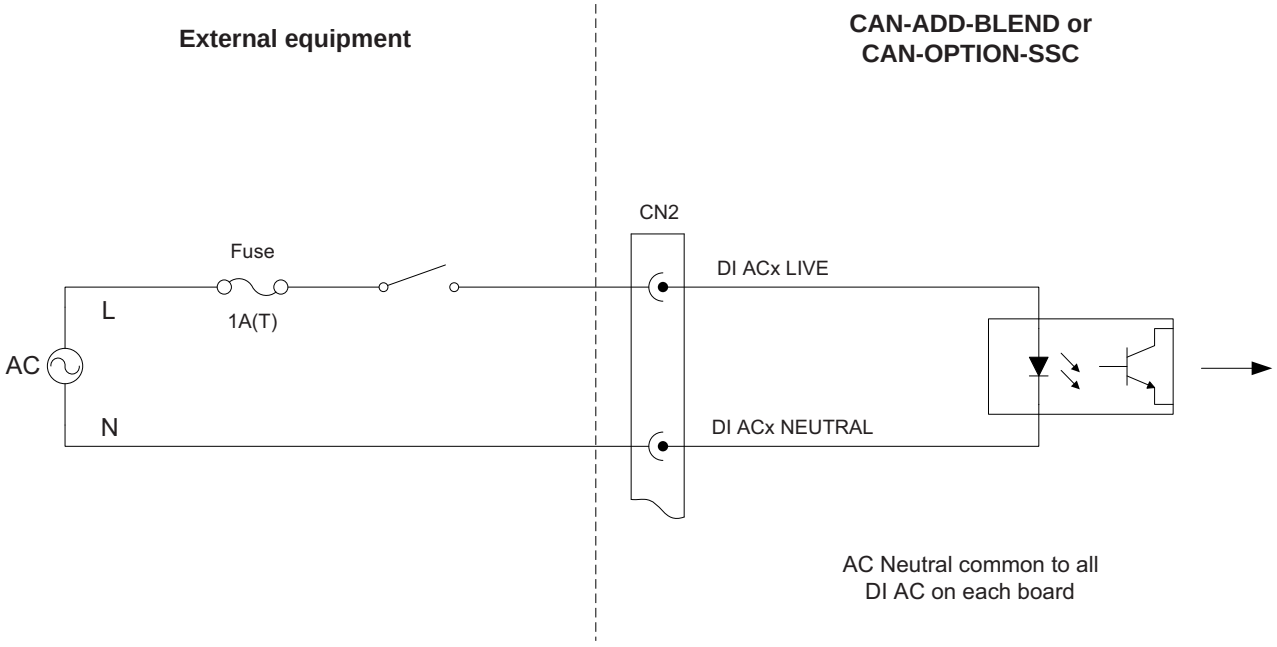


FIGURE 3-22 Digital Input AC connections

3.9.2.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Input voltage	-	-	265	V_{AC}
Input frequency	47	-	63	Hz
Input impedance	-	44	-	kΩ
High input (must turn on) voltage	85	-	-	V_{AC}
Low input (must turn off) voltage	-	-	20	V_{AC}
Input switching frequency	-	-	4	Hz
AC on time (T_{ON})	50	-	-	ms
AC off time (T_{OFF})	200	-	-	ms

3.9.3 Digital Input DC (DI DC/ OPT DI DC)

3.9.3.1 Functional Description

The function of the Digital Input DC is to convert switched DC into a signal that can be used by the controller to realize specific functionality needed for the customer.

A simplified block diagram is illustrated in FIGURE 3-23.

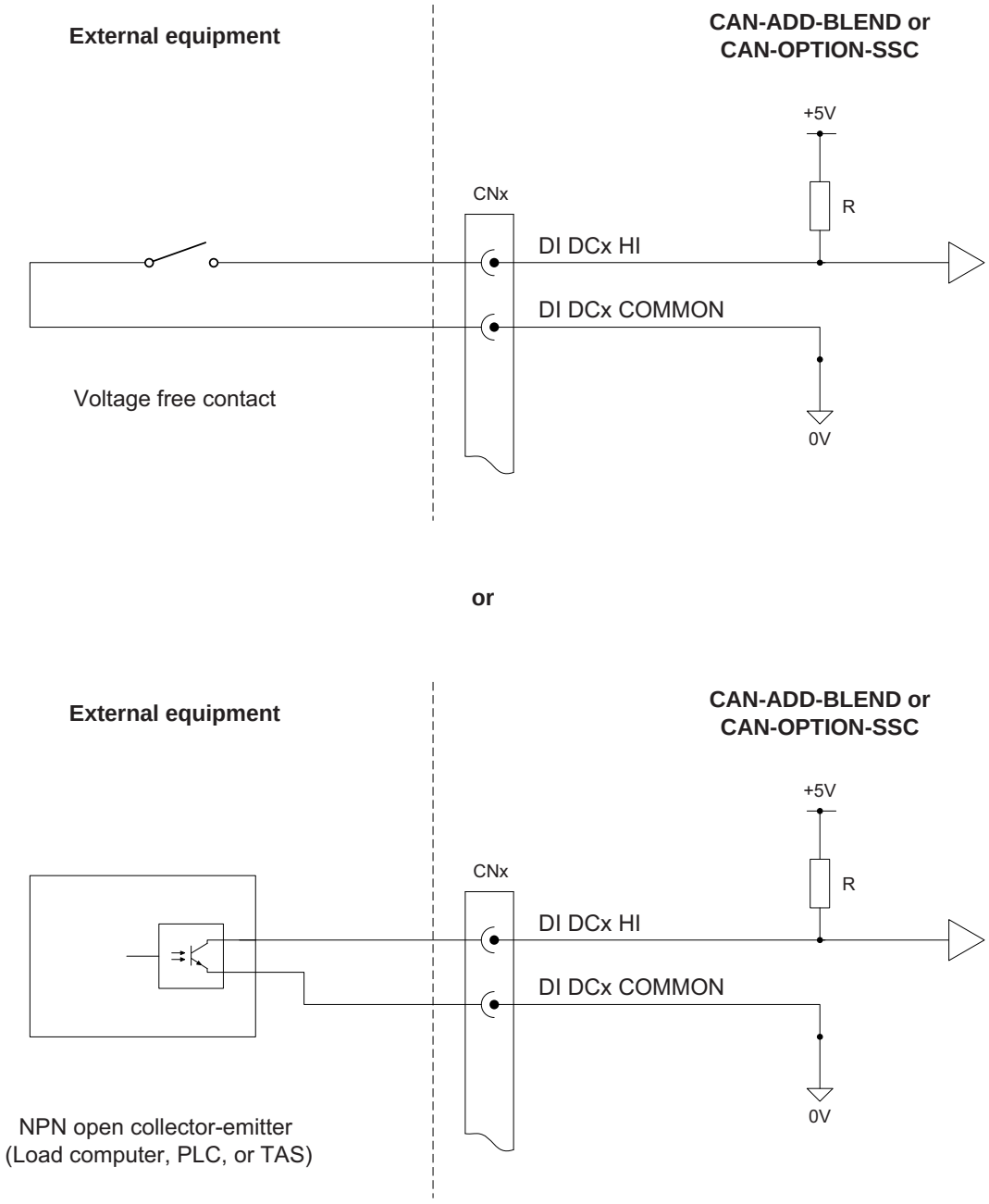


FIGURE 3-23 Digital Input DC connections

3.9.3.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Switching level V_H	5	-	30	V_{DC}
Switching level V_L	-	-	0.8	V_{DC}
Switching current (I_{SW})	10	-	-	mA
Input switching frequency	-	-	1	kHz
Input on time (T_{ON})	500	-	-	µs
Input off time (T_{OFF})	500	-	-	µs

3.9.4 Single-Pulse Input (Single PI)

3.9.4.1 Functional Description

The function of the Single-Pulse Input is to accept pulse signals from a wild stream single-pulse flowmeter, or single-scaled pulse signals from a load computer or TAS system.

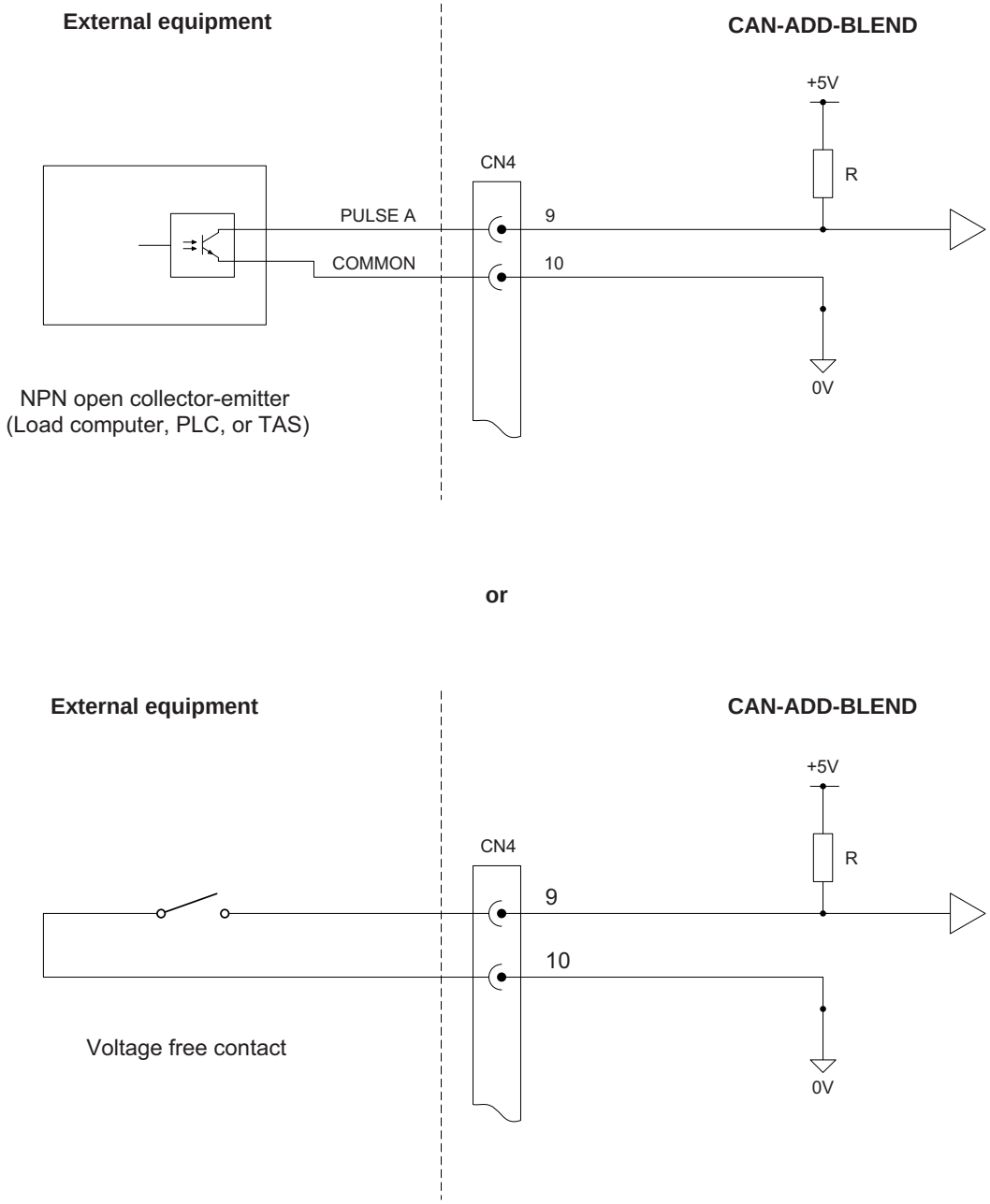


FIGURE 3-24 Single-Pulse Input connections

3.9.4.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Switching level V_H	5	-	30	V_{DC}
Switching level V_L	-	-	0.8	V_{DC}
Switching current (I_{SW})	10	-	-	mA
Input switching frequency	-	-	5	kHz
Input on time (T_{ON})	100	-	-	µs
Input off time (T_{OFF})	100	-	-	µs

3.9.5 Dual-Pulse Input (Quad PI)

3.9.5.1 Functional Description

The Dual-Pulse Input can accept signals from either one dual-pulse flow meter for applications requiring a *high level of pulse integrity* offered by a dual pulse flow meter (sometimes referred to as a quad (quadrature) flow meter), or one single-pulse flow meter. *See 5.11.4.1.1- PI.*

NOTE: The dual-pulse input cannot be used to accept signals from two separate single-pulse flow meters.

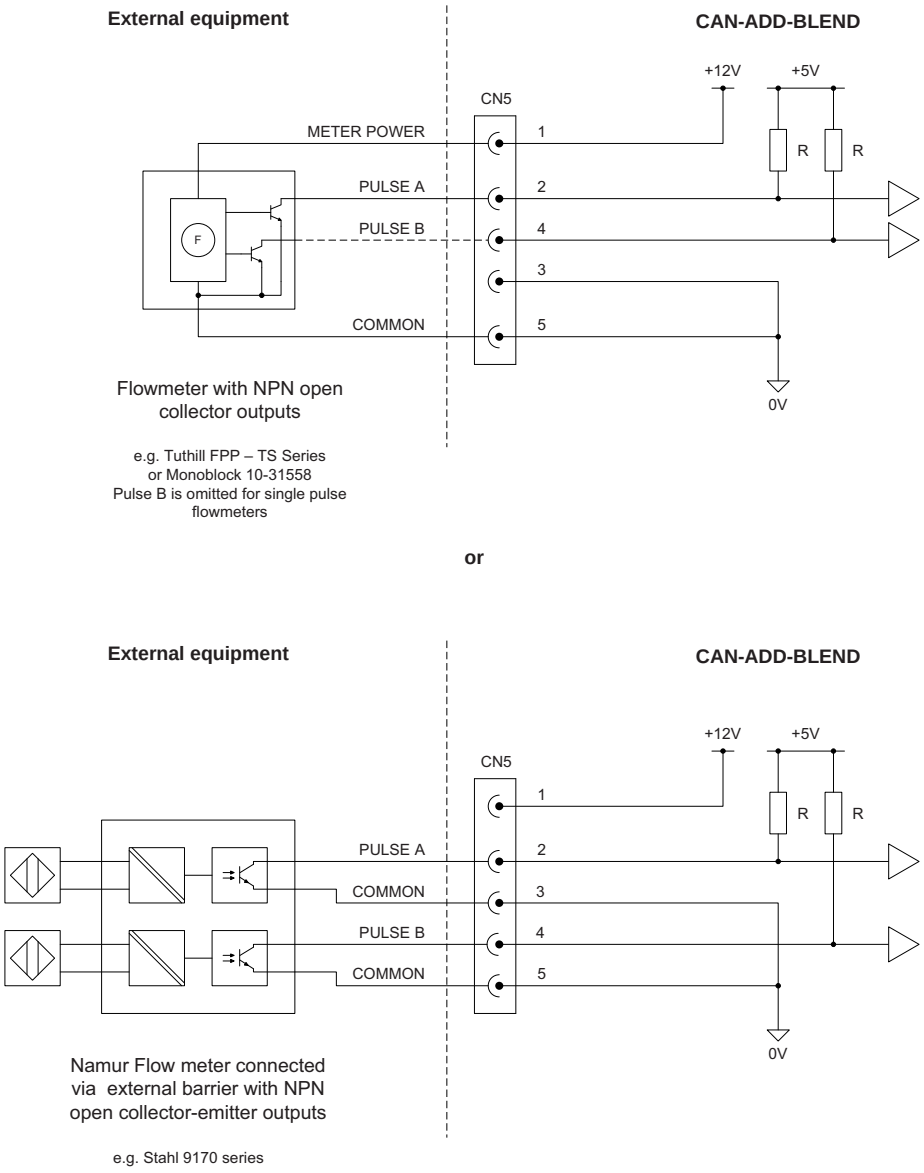


FIGURE 3-25 Dual-Pulse Input connections

3.9.5.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Switching level V_H	5	-	30	V_{DC}
Switching level V_L	-	-	0.8	V_{DC}
Switching current (I_{SW})	10	-	-	mA
Input switching frequency	-	-	5	kHz
Input on time (T_{ON})	100	-	-	µs
Input off time (T_{OFF})	100	-	-	µs
DPI Phase A with respect to B	-	90º	-	-

3.9.6 Analog Input (OPT AI DC)

3.9.6.1 Functional Description

The Analog Input supports 2-wire 4-20mA, and can be configured by a switch to operate in *active* or *passive* mode.

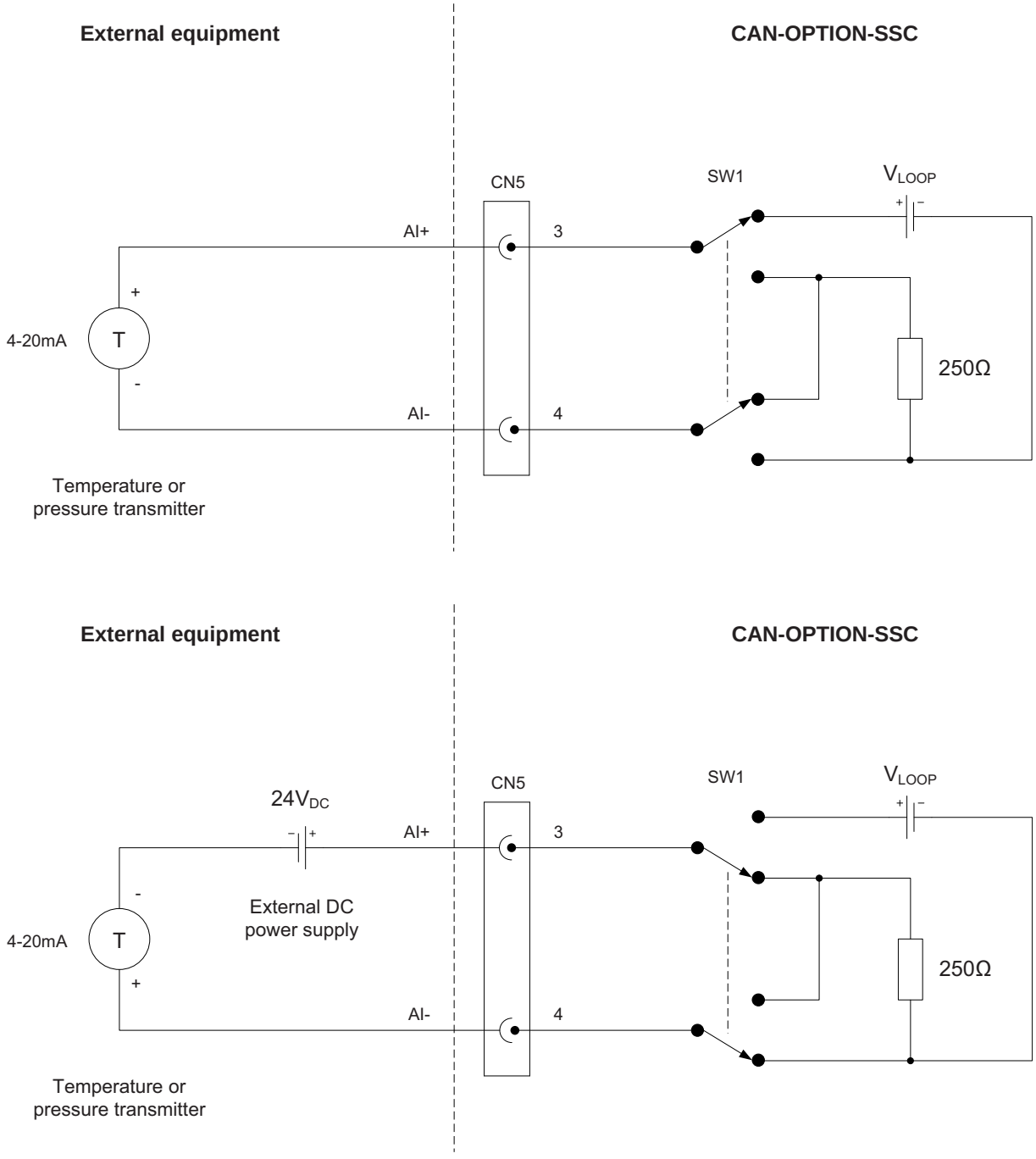


FIGURE 3-26 Analog Input connections - Active mode (top) and Passive mode (bottom)

The Analog Input is *primarily designed* to measure *pressure*, to allow pressure compensation for MID-blending and -additive applications.

The Analog Input does not support temperature measurement for MID applications. For non-MID applications, the Analog Input can be used for temperature, pressure, or any other type of analog 4-20mA signal measurement.

The Analog Input interface is not intrinsically safe, and external devices connected to the Analog Input must conform to Ex d safety standards when used in a hazardous area.

3.9.6.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
V_{LOOP} (passive mode)	23.0	24.0	42.5	V_{DC}
$V_{LOOP\ (ISO)}$ (active mode)	24.0	28.0	32.0	V_{DC}
$I_{LOOP\ (ISO)}$ (active mode)	-	-	25.0	mA
Nominal loop current range	4	-	20	mA
Loop current measurement range	0	-	25	mA
Max. loop current	-	-	40	mA
Nominal input resistance (R_S)	249.75	250	250.25	Ω
External reference voltage (V_{REF})	2.49875	2.5	2.5012	V_{DC}
Accuracy (without external transmitter)	-	-	± 1.0	%

3.9.7 Resistance Temperature Detector (OPT RTD)

3.9.7.1 Functional Description

The RTD input allows the controller to read the temperature of a remotely connected PT100 resistance temperature detector. The RTD input supports 3-wire and 4-wire connections, as illustrated in FIGURE 3-27.

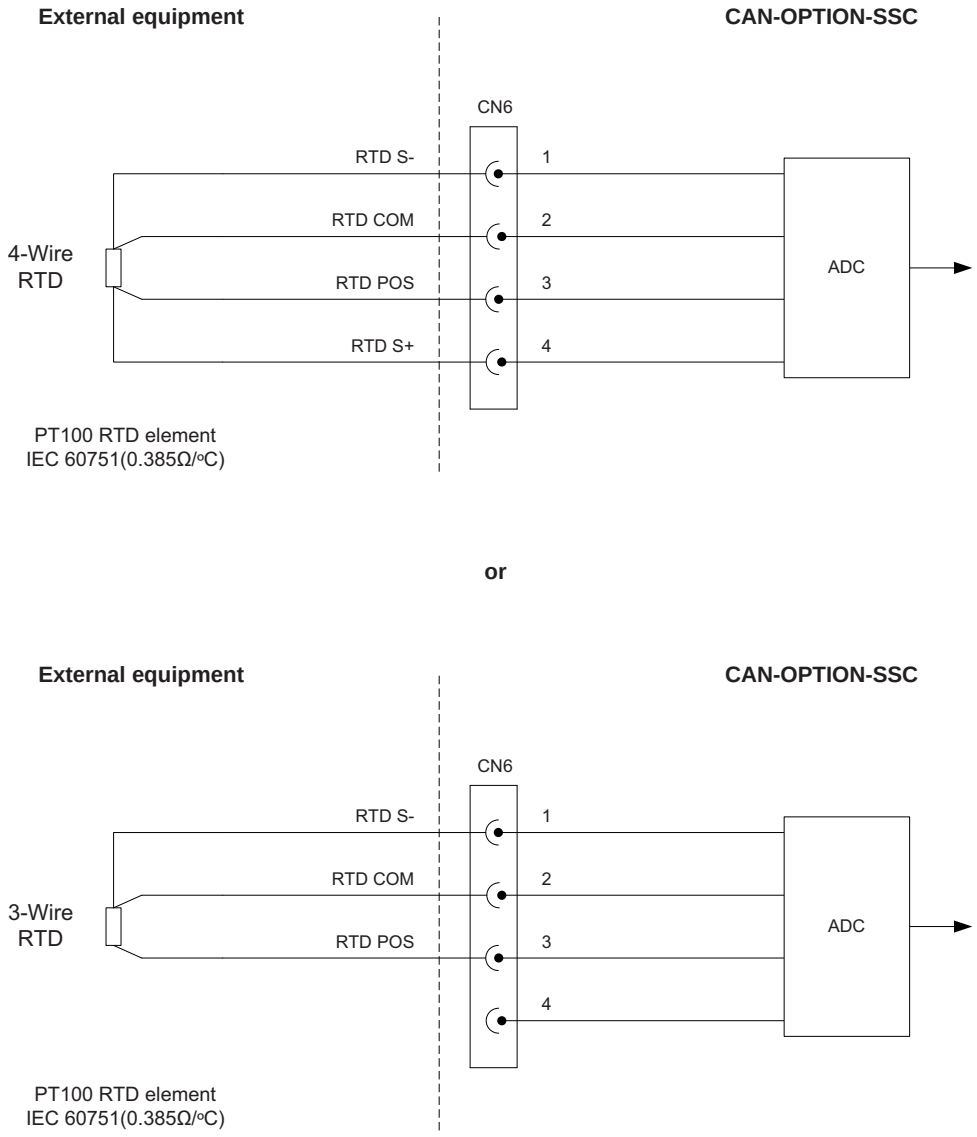


FIGURE 3-27 Resistance Temperature Detector connections

The following RTD types are accepted:

RTD type	Connection	Alpha co-efficient
PT100	3-Wire or 4-Wire (Kelvin connection)	IEC 60751 (0.385 Ω/°C / 0.214 Ω/°F)

The selection of 3-Wire or 4-Wire RTD type is performed in software, but the RTD must be connected to the circuit as shown in FIGURE 3-27.

3.9.7.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Temperature measurement range	-100 [-148]	-	+200 [+392]	°C [°F]
MID temperature measurement range	-20 [-4]	-	+55 [+131]	°C [°F]
Measurement error (-50 ... +150°C/ -58 ... +302°F)	-	-	±190	mΩ
	-	-	±0.5 [±0.9]	°C [°F]
Measurement error (-20 ... +55°C/ -4 ... +131°F)	-	-	±116	mΩ
	-	-	±0.3 [±0.5]	°C [°F]
RTD current source	-	500	-	µA
RTD cable length	-	-	150	m

3.10 Output Functions

3.10.1 General

The SSC supports the electronic output functions as follows.

Output function	I/O block name	
	CAN-ADD-BLEND	CAN-OPTION-SSC
Digital Output Solid State Relay AC	DO AC	OPT DO AC
Digital Output Electromechanical Relay	DO EMR	OPT DO EMR
Pulse output	PO DC	-
Analogue Output	-	OPT AO DC

3.10.2 Digital Output Solid State Relay AC (DO AC/ OPT DO AC)

3.10.2.1 Functional Description

The DO AC allows the controller to switch high-voltage AC signals, to control solenoids, digital control valves, alarms and other loads.

The two output terminals behave as a “volt-free” contact and require an external AC power supply to drive a load as illustrated in FIGURE 3-28.

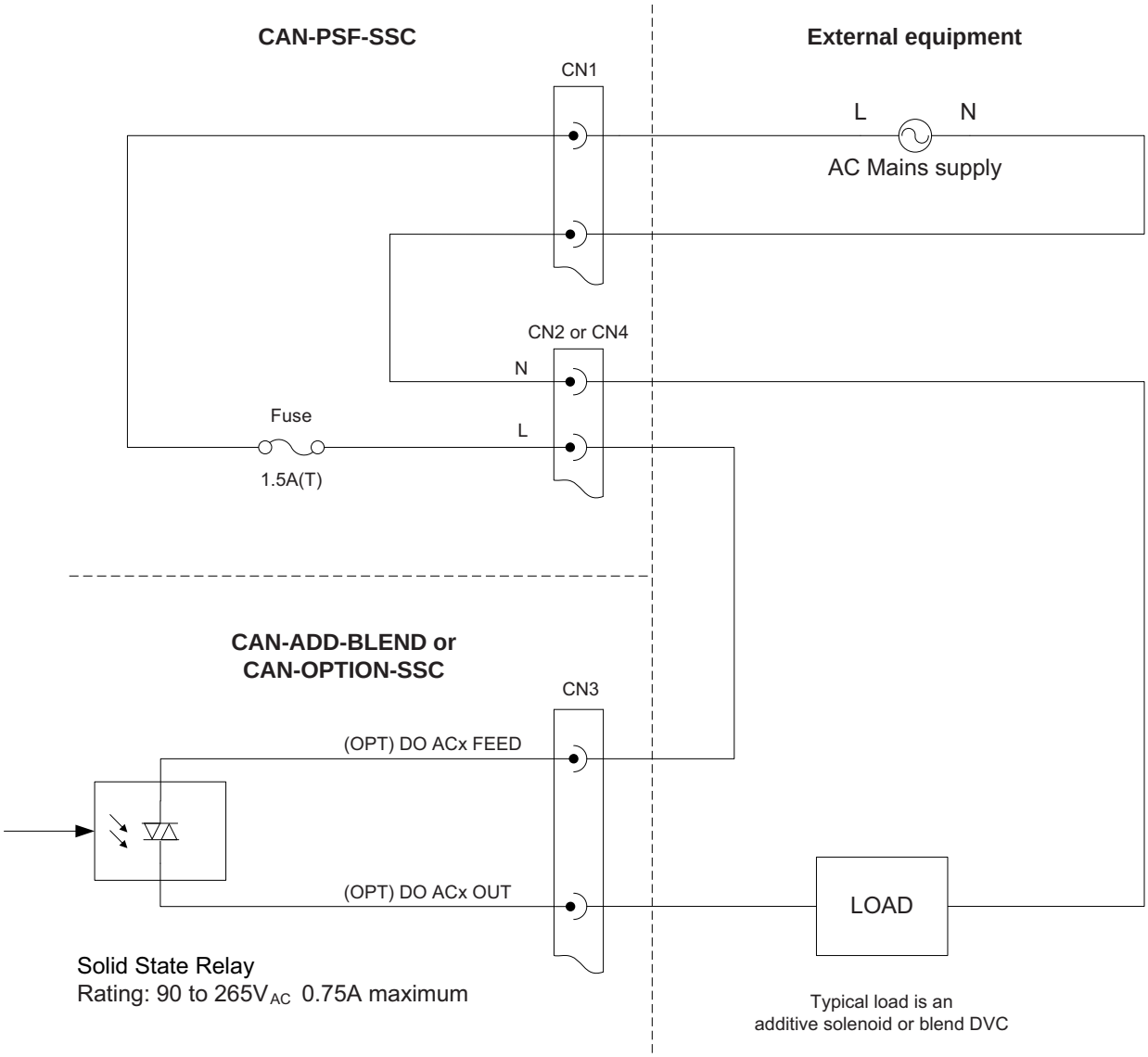


FIGURE 3-28 Solid State Relay “Self-powered” connections

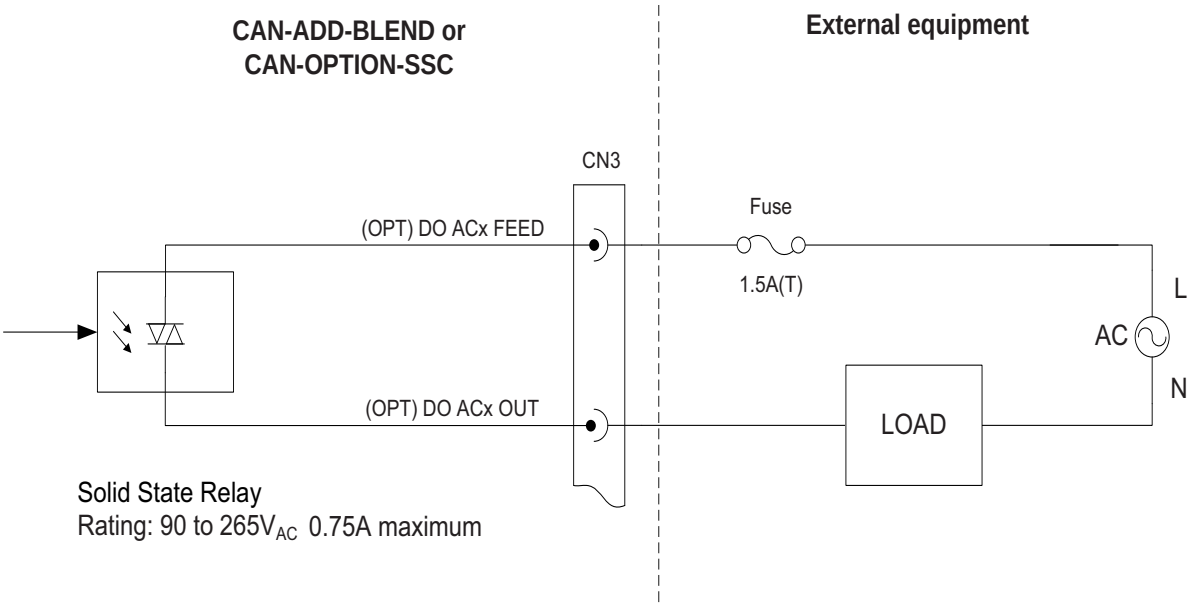


FIGURE 3-29 Solid State Relay “Externally powered” connections

3.10.2.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Output feed voltage	90	-	265	V_{AC}
Output feed frequency	47	-	63	Hz
Output steady state load current	25	-	750	mA
Output surge load current	-	-	6	A
Off state output leakage current	-	-	1	mA
Switching time	-	-	10	ms

3.10.2.3 Output Specifications

Description	Unit
Operating Voltage (47-63 Hz) [Vrms]	12-280
Transient Overvoltage [Vpk]	600
Maximum Off-State Leakage Current @ Rated Voltage [mArms]	0.1
Maximum Off-State dv/dt @ Maximum Rated Voltage [V/µsec] (3)	500
Maximum Load Current [Arms]	1.5
Maximum Load Current [Arms]	0.025

Description	Unit
Maximum Surge Current (16.6ms) [Apk]	80
Maximum On-State Volatge Drop @ Rated Current [Vpk]	1.5
Maximum Power Factor (with Maximum Load)	0.5

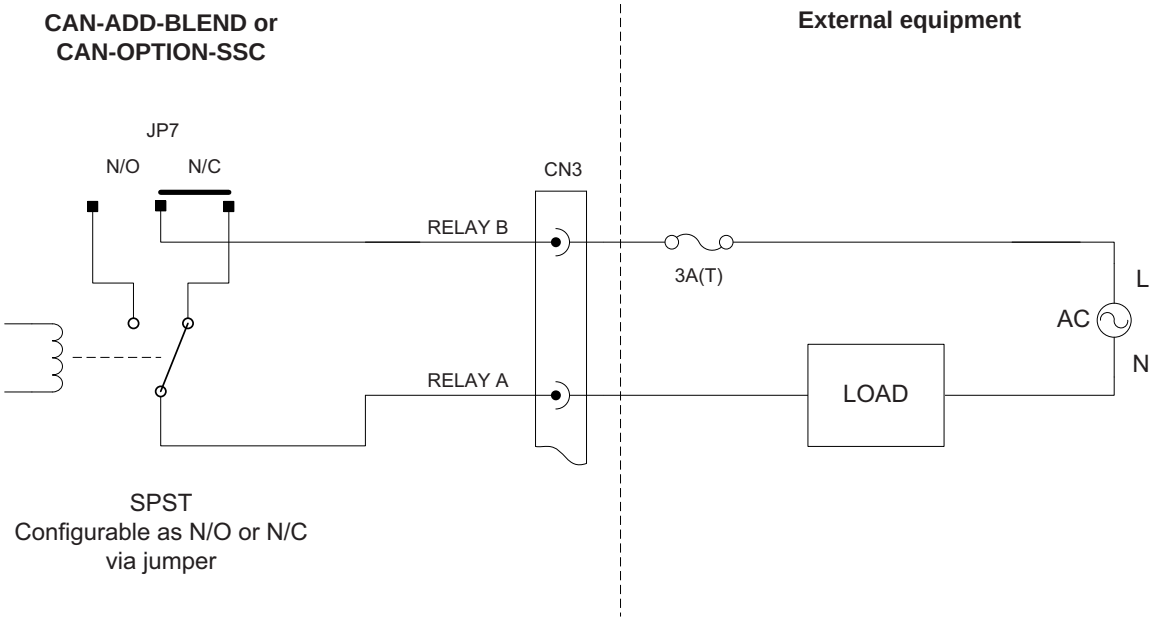
3.10.3 Digital Output Electromech. Relay (DO EMR/ OPT DO EMR)

3.10.3.1 Functional Description

The DO EMR allows the controller to switch high-voltage AC signals to control alarms and other loads.

The two output terminals are “volt-free” contacts and require an external power supply to drive a load.

The relay output contacts are effectively SPST (Single Pole Single Throw) and are configurable through a jumper[1] to be either normally open (NO) or normally closed (NC). See FIGURE 3-30.



- Contact rating: 265V_{AC} 3A max.

FIGURE 3-30 Electromechanical Relay connections

1. For physical location(s), see CHAPTER 5.

3.10.3.2 Characteristics

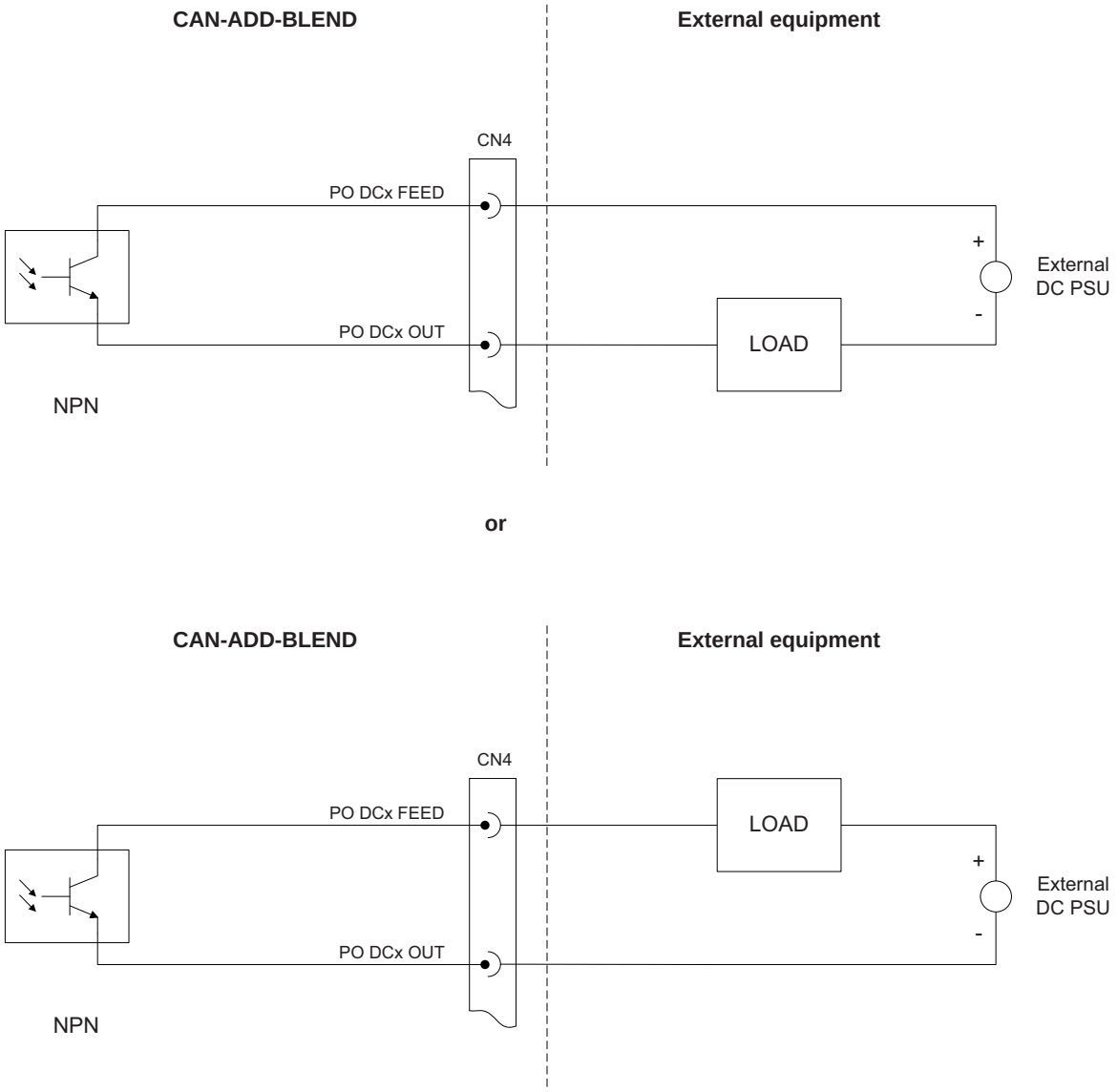
Item	Minimum	Typical	Maximum	Unit
Load Voltage to be switched	-	-	265	V_{AC}
Switching current AC	-	-	3	A
Steady state current AC	-	-	3	A
Output contact type	-	SPST	-	-
Operate time	-	-	10	ms
Release time	-	-	10	ms
Setting time	-	-	50	ms

3.10.4 Pulse Output (PO DC)

3.10.4.1 Functional Description

The Pulse Output allows the controller to switch DC signals to interface to a PLC, load computer, TAS, or other system. The PO is not designed to switch high-current loads.

The two output terminals behave as a “volt-free” contact and require an external power supply to drive a load as illustrated in FIGURE 3-31.



- PO Rating: 30V_{DC} 0.05A maximum

FIGURE 3-31 Pulse Output connections

3.10.4.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Output load current (Sink)	-	-	50	mA
Output load current (Source)	-	-	50	mA
Saturation voltage $V_{CE(SAT)}$	-	-	1.0	V_{DC}
Max. Switching frequency F_{MAX}	-	-	0.3	kHz
T_{ON} and T_{OFF} pulse width	3.33	-	-	ms

3.10.5 Analog Output (OPT AO DC)

3.10.5.1 Functional Description

The Analog Output supports 2-wire passive 4-20 mA. The Analog Output does NOT provide a power supply to power the loop. See FIGURE 3-32.

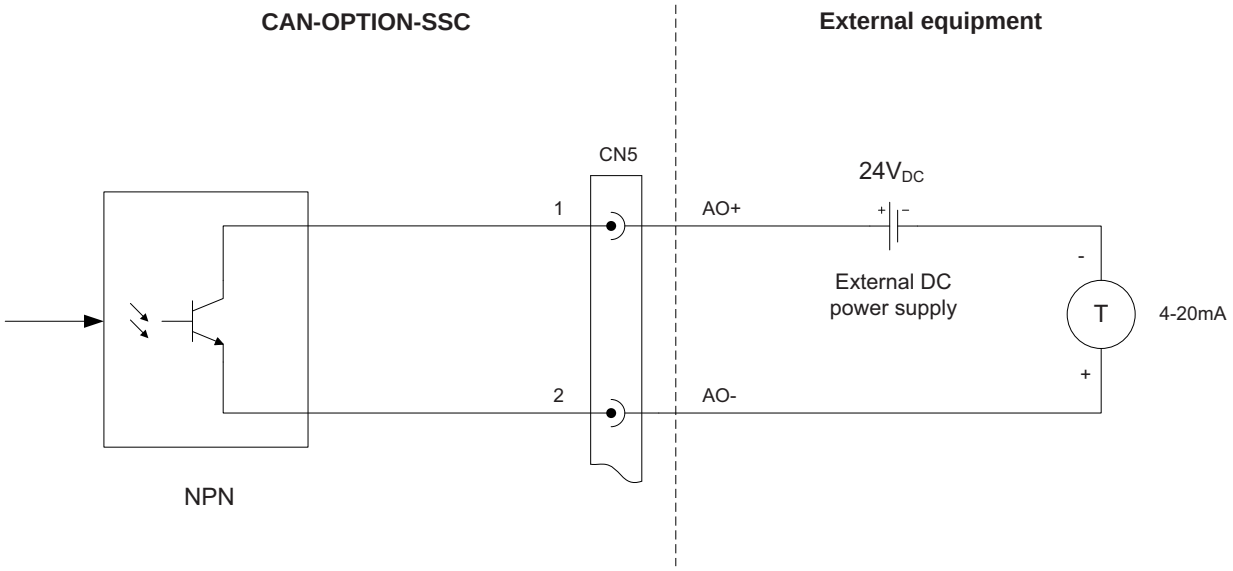


FIGURE 3-32 Analog Output connections

3.10.5.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
V_{LOOP}	23.0	24.0	36.0	V_{DC}
Nominal loop current range	4	-	20	mA
Loop current control range	3	-	21	mA
Accuracy (without external receiver)	-	-	±1.0	%
Load resistance	0	-	750	Ω

3.11 Communication Functions

3.11.1 Communication (COMMS)

3.11.1.1 Functional Description

The Communication block allows the SSC to communicate through an RS-485 connection with external devices including a load computer, TAS system, Fusion4 Portal, or other remote interface.

For the CAN-ADD-BLEND, the COMMS block can be configured for 2-wire half-duplex or 4-wire full duplex.

The CAN-OPTION-SSC provides 2-wire half-duplex. See FIGURE 3-33 and FIGURE 3-34.

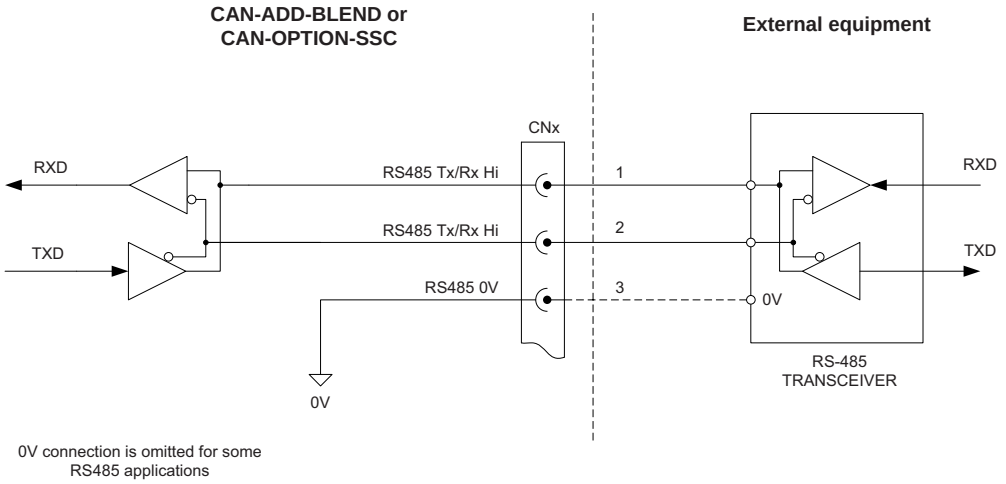


FIGURE 3-33 RS Communication 2-Wire connections

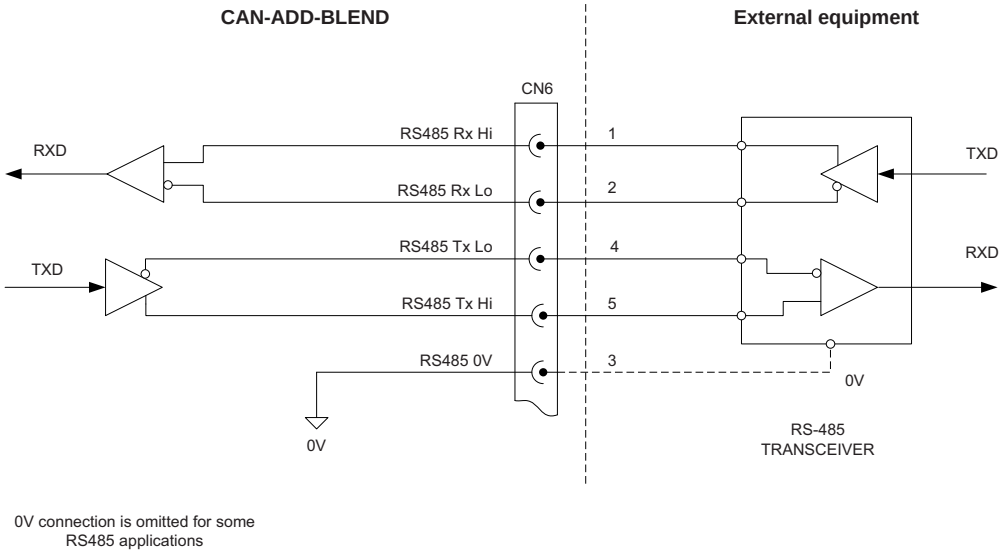


FIGURE 3-34 RS Communication 4-Wire connections (CAN-ADD-BLEND only)

For the *4-wire full-duplex* communication, the external device is the always the master and the COMMS block is the slave.

3.11.1.2 Characteristics

Item	Minimum	Typical	Maximum	Unit
Terminator resistor R_T	118	120	122	Ω
Driver common mode voltage	-1	-	+3	V
Driver output voltage, Open circuit	1.5 -1.5	-	6 -6	V
Driver output voltage, Loaded	1.5 -1.5	-	5 -5	V
Driver output short circuit current	-	-	±250	mV
Receiver common mode voltage	-7	-	+12	V
Receiver sensitivity	-	-	±200	mV
Receiver input resistance	12	-	-	kΩ
Data transmission rate	-	-	500	kbps
Number of connected devices	-	-	32	-

3.11.1.3 Cable Specifications

Item	Minimum	Typical	Maximum	Unit
Cable length	-	-	1000	m
Cable characteristic impedance	-	120	-	Ω
Cable DC resistance	-	-	100	Ω
Cable capacitance	-	-	55.77 [17]	pF/m [pF/ft]

CHAPTER 4 INSTALLATION

4.1 Mounting and Dimensions

The SSC-B can be mounted by means of 2 x M10 socket-head bolts.

See FIGURE 4-1.

NOTE: The LAD connector (arrow) should be on the underside of the enclosure, when mounted in the correct orientation.

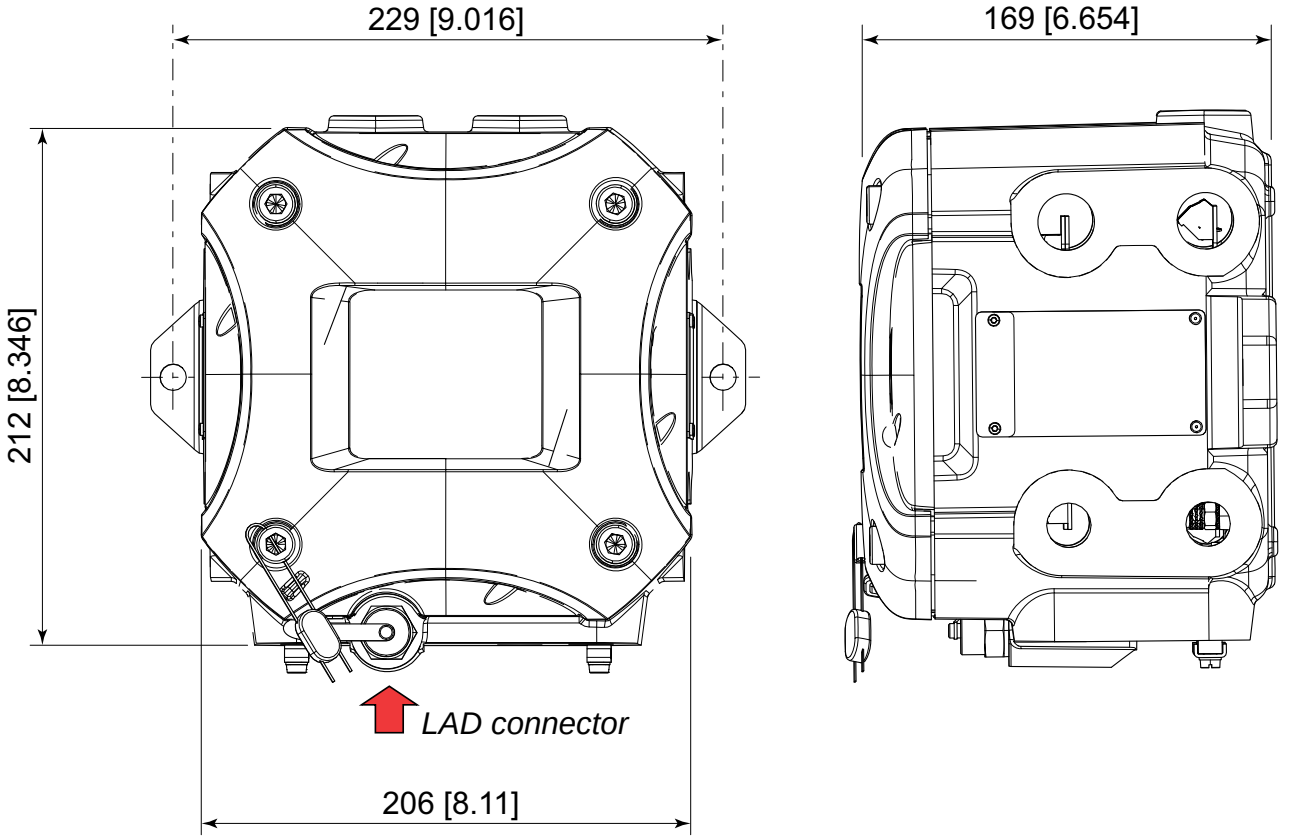


FIGURE 4-1 Main dimensions of the SSC-B in mm [inches]

F4A10-0009

NOTE: Provision should be made where possible, to minimize the impact of direct sunlight on the SSC. This helps decrease the effect of radiated heat on the enclosure, and prolong screen life.

4.2 Gland Entries

4.2.1 General

The SSC-B has *12 metric* gland entries or *8 NPT* gland entries.

FIGURE 4-2 shows the metric gland option.

Entries marked A and B are field entries. These are accessible by removing all PCBs (except power board) from the SSC-B. Entries marked C are entries that are typically pre-assembled during manufacture.

The temperature rating of the glands must be at least 20ºC [68ºF] above maximum operating temperature.

Therefore, a rating of 85°C [185ºF] is suitable for the entire temperature range.

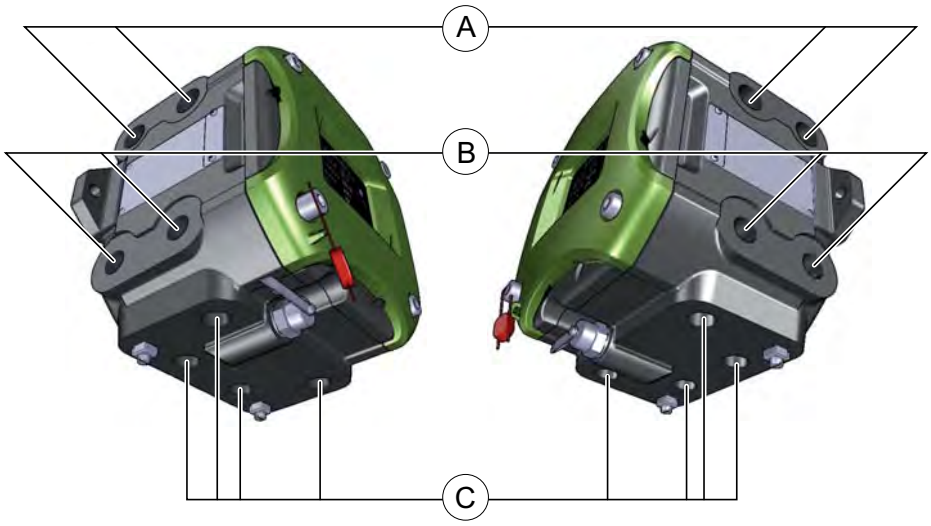


FIGURE 4-2 SSC-B metric gland entries

F4A10-0010

4.2.2 Metric Gland Entries (FIGURE 4-3)

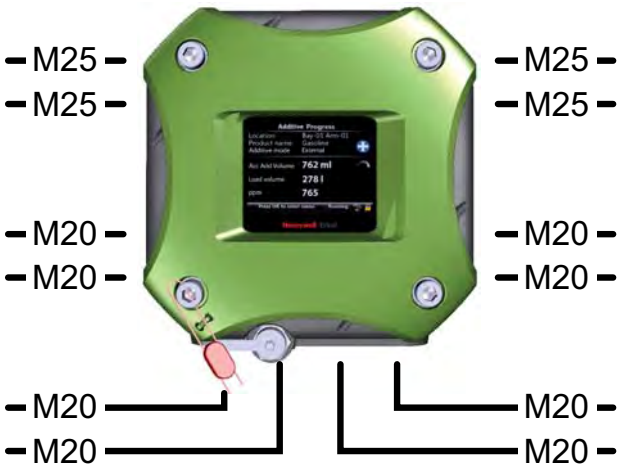


FIGURE 4-3 Metric gland entries overview

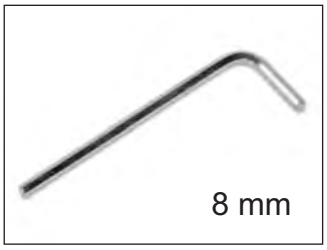
F4A10-0011

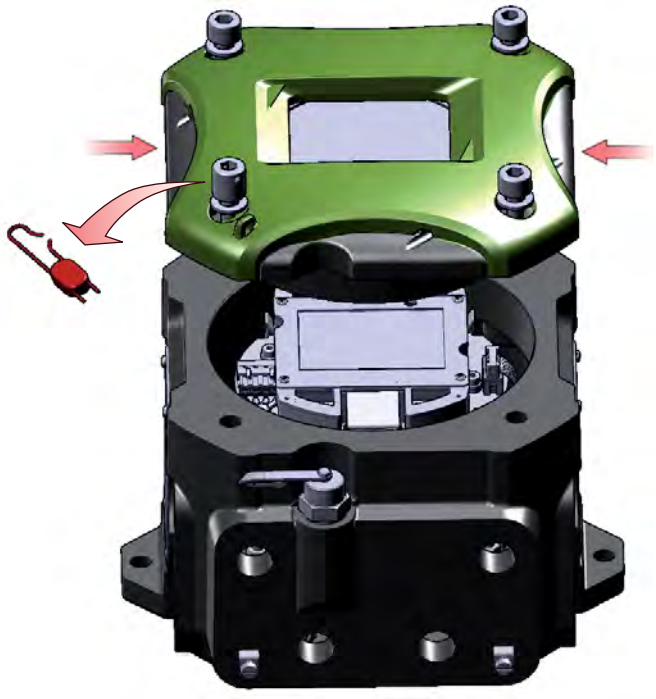
4.2.3 NPT Gland Entries (FIGURE 4-4)

FIGURE 4-4 NPT gland entries overview F4A10-0012

4.3 Removing the Lid

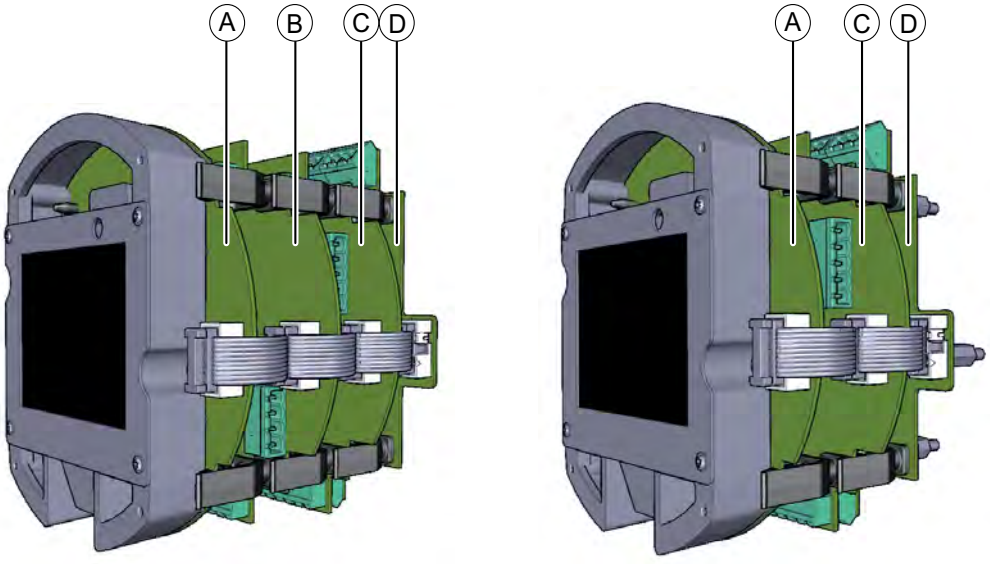
1. Remove W&M seal if applicable.
2. Loosen the 4 captive socket-head screws with an 8 mm Allen key.
3. Pull the lid at arrowed locations (figure below - right). Rotate gently to aid removal.
4. If the lid is stuck, carefully force it open with 2 screwdrivers (figure below - left).





5. Make sure the O-ring is in place (see figure below).
6. Place lid on a clean surface.

4.4 Removing the PCBs



F4A10-0005

FIGURE 4-5 Full-configuration SSC-B (left) and 3-PCBs configuration (right)

refer to FIGURE 4-5	PCB name	Module* name	Description
A	CAN-HMI-SSC	FS-HMI	Controls the display and the LAD (Local Access Device) interfaces.
B	CAN-OPTION-SSC	FS-OPTION	Additional IO functions are available with this optional board.
C	CAN-ADD-BLEND	FS-STREAM	Controls the blend stream.
D	CAN-PSF-SSC	-	Delivers the internal power for the SSC-B.

* A PCB with software installed.

In order to be able to mount the field entries, all PCBs (except the power board) must be removed from the SSC-B.

CAUTION! Wear an ESD wrist strap while handling a printed circuit board from the SSC-B, to prevent damage by electrostatic discharge (ESD).

1. Remove the CAN-HMI-SSC board. See FIGURE 4-6.

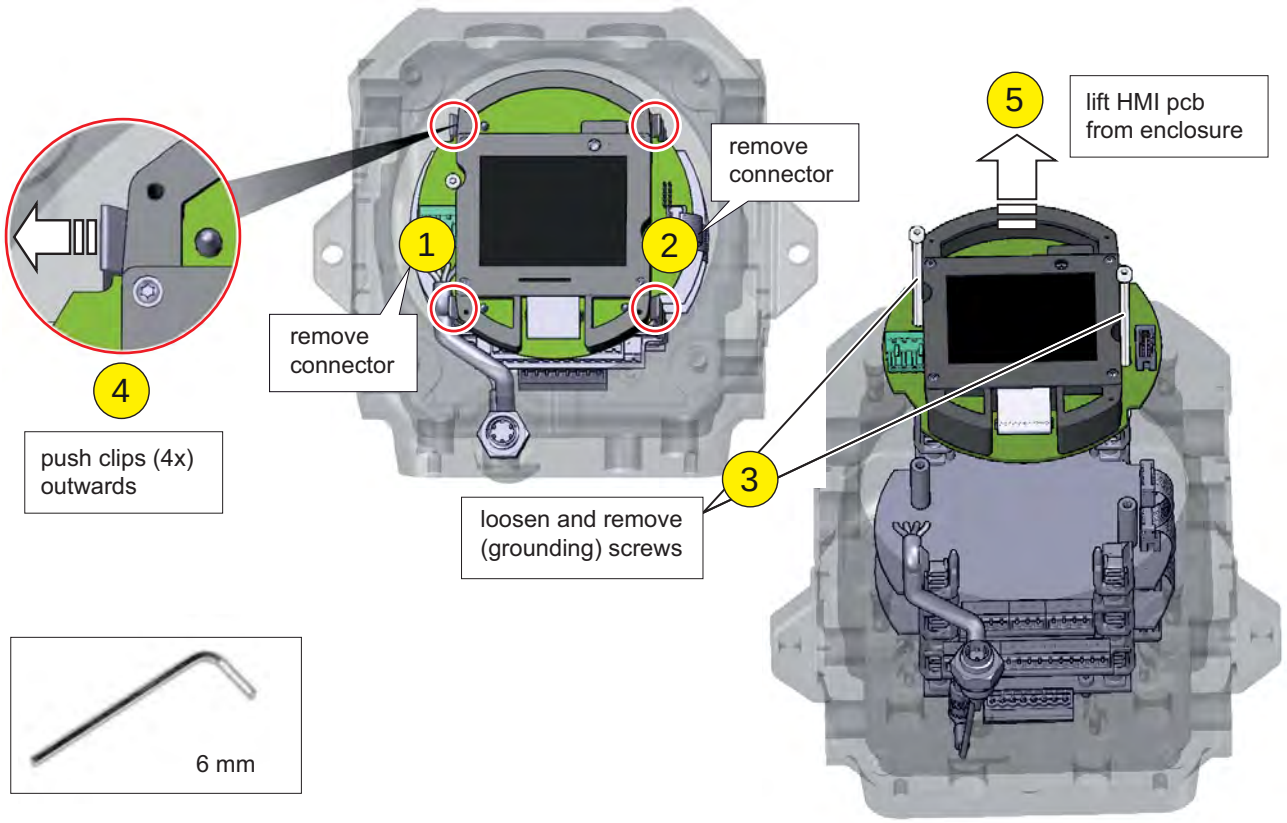


FIGURE 4-6 Removing the CAN-HMI-SSC board

2. Remove the other PCBs (except CAN-PSF-SSC) one after another according to FIGURE 4-7.

3. After removal of each PCB from the enclosure, disconnect its terminal connectors.

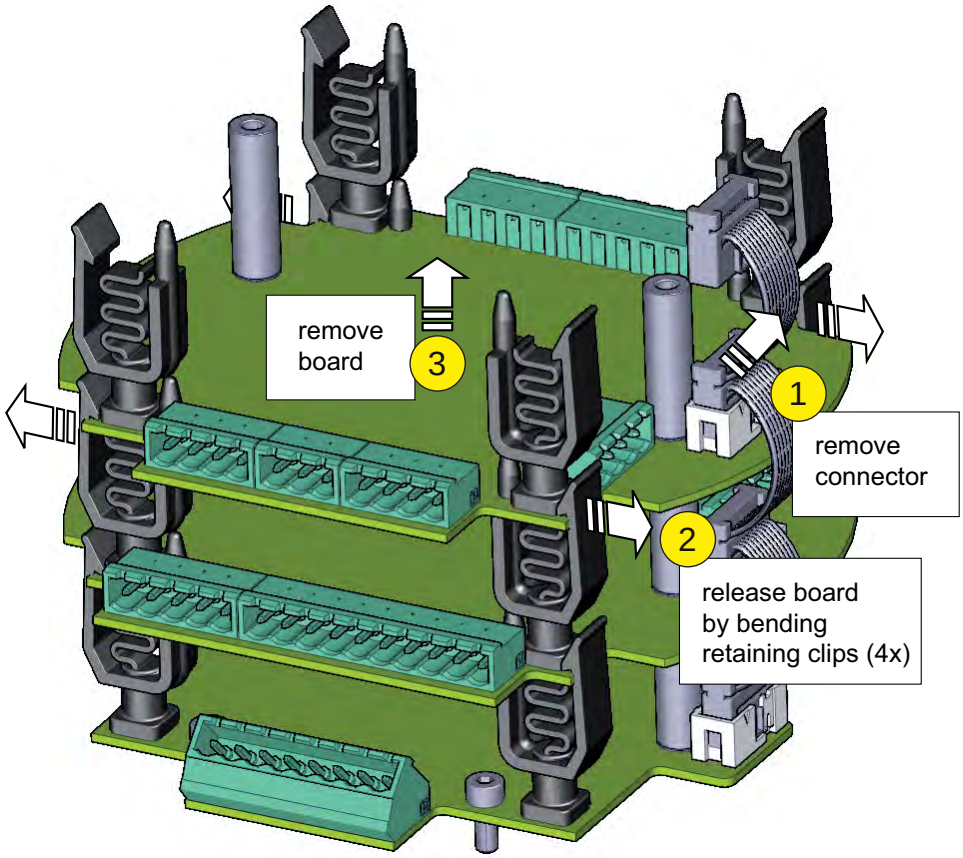


FIGURE 4-7 Removing the other PCBs

4.5 Replacing the PCBs

- Replace PCBs in reverse order of removal.

NOTE: To ensure correct PCB orientation before replacing, make sure the PC ID label is readable from left to right.

1. Connect appropriate terminal connectors outside the enclosure.
2. Carefully replace each PCB into enclosure whilst guiding attached wiring to the sides of the enclosure.
3. Align PCB with connectors below, and depress into place, ensuring each of the 4 clips clicks into place.
4. Replace PCB spacers.
5. Connect flatcable connector.
6. Repeat for each remaining PCB.

7. Replace HMI board, and secure with the 2x grounding screws (Allen key 6 mm).

4.6 Replacing the Lid

1. Make sure the O-ring of the lid is in place and not damaged. If damaged, replace O-ring first.
2. Make sure the spigot faces are not damaged or contain dirt.

CAUTION! Do NOT apply sealant to faces and minimize the use of grease!

3. Make sure cables are clear of spigot face when re-inserting the lid.
4. Rotate gently to aid insertion.
5. Mount the 4 captive socket-head screws with an 8 mm Allen key. Tighten with 16 Nm.
6. Apply new W&M seal if applicable.

4.7 Fusing and Power Consumption

4.7.1 Fusing

The CAN-PSF-SSC board converts AC mains voltage into a DC voltage, to power the other SSC modules.

NOTE: All fusing is done internally on the CAN-PSF-SSC board, so no external fusing is required.

It also delivers fuse-protected AC power for *external* devices.

A maximum current of 4 A can be drawn as defined by fuse F1 (AC mains input). For more information, see 3.6.1.4 - CAN-PSF-SSC.

4.7.2 Power consumption SSC

Maximal	Typical
15.9 W	9.9 W

4.8 Wiring Termination Guidance

4.8.1 Wiring Architecture

- Ex i wiring is separated from other wiring.
- In order to limit interference between low and high voltage signals, a logical separation between cables carrying these signals has been created. See FIGURE 4-8.

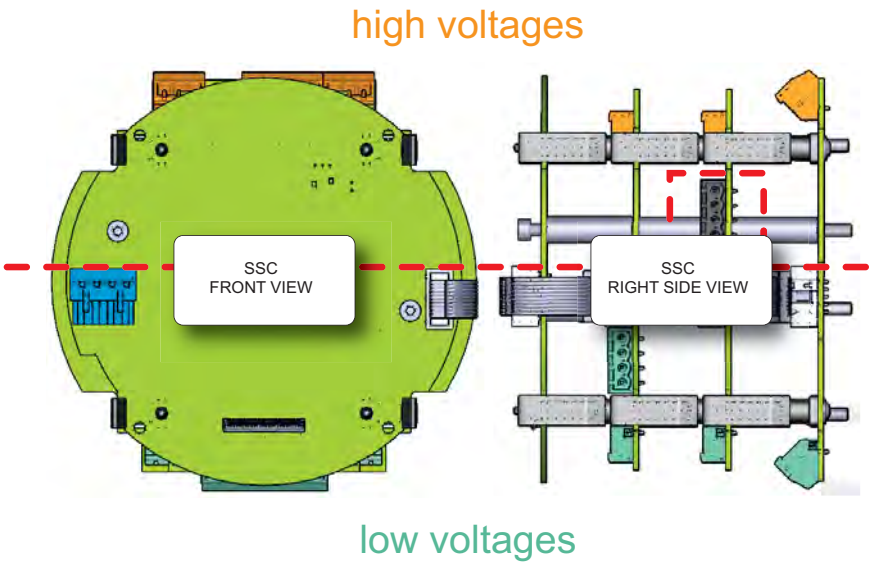


FIGURE 4-8 High/low voltages separation concept

- The following measures are taken to adequately identify connections with different functions, and to avoid connector placement confusion:
  - Use of different number of pins.
  - In case of same number of pins with different functions, a connector coding profile of insulating material is applied.
  - Color-coding of the connectors, see the following table.

Color	Function
Orange	High voltage signals
Green	Low voltage signals
Black	Communication signals
Blue	Ex i signals

4.8.2 General

CAUTION! All terminated cables should be left with sufficient excess length to allow each PCB to be fully withdrawn from the enclosure when the connectors are still in place. This is to allow connectors to be affixed to each board just outside the enclosure, before locating them inside, and to allow each board to be fully withdrawn from the enclosure before the connectors are removed. This negates the requirement to attach and remove connectors inside the enclosure and facilitates best practice for efficient assembly and disassembly of the electronics stack.

4.8.3 Wire Sizes and Types

As there are no strictly prescribed wire sizes, only following guidelines can be given:

- All I/O terminals accepts wires with a cross section area of 0.2 to 2.5 mm^2 [AWG 24 to 14].
- For mains / high-voltage wiring, 1.5 mm^2 [AWG 16] is recommended.
- For low-voltage wiring (DI, PO, AI, AO, RTD, and so on), 0.75 mm^2 [AWG 18] or 0.5 mm^2 [AWG 20] is recommended.

All primary wiring needs to be provided with insulation rated for minimum 300 V, with a rated temperature of at least 105°C [221°F] and with a conductor size of at least 0.75 mm^2 [AWG 18].

For communications, *specific RS-485 cable* - typically 0.25 mm^2 [AWG 24] - must be used, in conformity with the following table.

Item	Conditions	Minimum	Type	Maximum	Unit
Cable length	-	-	-	1000 [3281]	m [ft]
Cable characteristic impedance	-	-	120	-	Ω
Cable DC resistance	Conductor end to end	-	-	100	Ω
Cable capacitance	Conductor to conductor	-	-	55.77 [17]	pF/m [pF/ft]

4.8.4 Recommended Cables

Cable type	Number of wires	Function
XLPE/SWA/PVC 4C X 1.5MM 600/1000V BS5467	3	230 VAC Mains Supply Input
XLPE/SWA/PVC 4C X 1.5MM 600/1000V BS5467	2	230 VAC Alarm Output
XLPE/SWA/PVC 4C X 1.5MM 600/1000V BS5467	4	230 VAC Permissive Input
3C X 0.75MM2 YYNR PVC	4	230 VAC Digital Controlled Valve Output
3C X 0.75MM2 YYNR PVC	4	230 VAC Solenoid Supply Output
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	2	12 VDC Switched Output
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	2	12 VDC Switched Input
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	2	Analog Output (maximum 24 V, 3.2 - 24 mA)
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	4	Analog Input (maximum 24 V, 3.2 - 24 mA)
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	2	Analog Output (maximum 24 V, 3.2 - 24 mA)
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	2	Pulse Output (maximum 12V, 10 KHz)
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	3	Pulse Input (maximum 12V, 10 KHz)
BS5308 1X4X0.5MM COL SCREEN SWA P1T2 PVC	4	Analog input RTD (maximum 24V, 1.5 mA)
BELDEN 9842 2PAIR 24AWG LSNH/SWA, ni 120 Ω	4	RS485 Serial Communication Interface
BELDEN 9842 2PAIR 24AWG LSNH/SWA, ni 120 Ω	4	RS485 Serial Communication Interface

4.8.5 Wire Crimps

There are no strictly prescribed wire crimps.

However, it is advised as a good practice to fit crimps (bootlace ferrules) to *multi-strand cable wires*.

NOTE: Wire crimps are to reinforce the fine wire strands when terminating a cable into a connector block.

Wire crimps do not need to be fitted for solid-core cable wires.

4.9 W&M (MID) Sealing

4.9.1 W&M sealing can be done in 3 ways (see also FIGURE 4-9):

Description	Effect	Remarks
Physical device sealing	Preventing unauthorized opening of the housing	See 3.5.1 and 3.7.1.
Jumper/ switch setting	Protection of the legally relevant configuration entities and firmware	See: • 3.6.1.1.2 (CAN-HMI-SSC) • 3.6.1.2.3 (CAN-ADD-BLEND) • 3.6.1.3.3 (CAN-OPTION-SSC)
Software sealing	Protection of the legally relevant configuration entities and firmware	Activated by LAD, see 5.17.4.1 - W&M Sealing Wizard

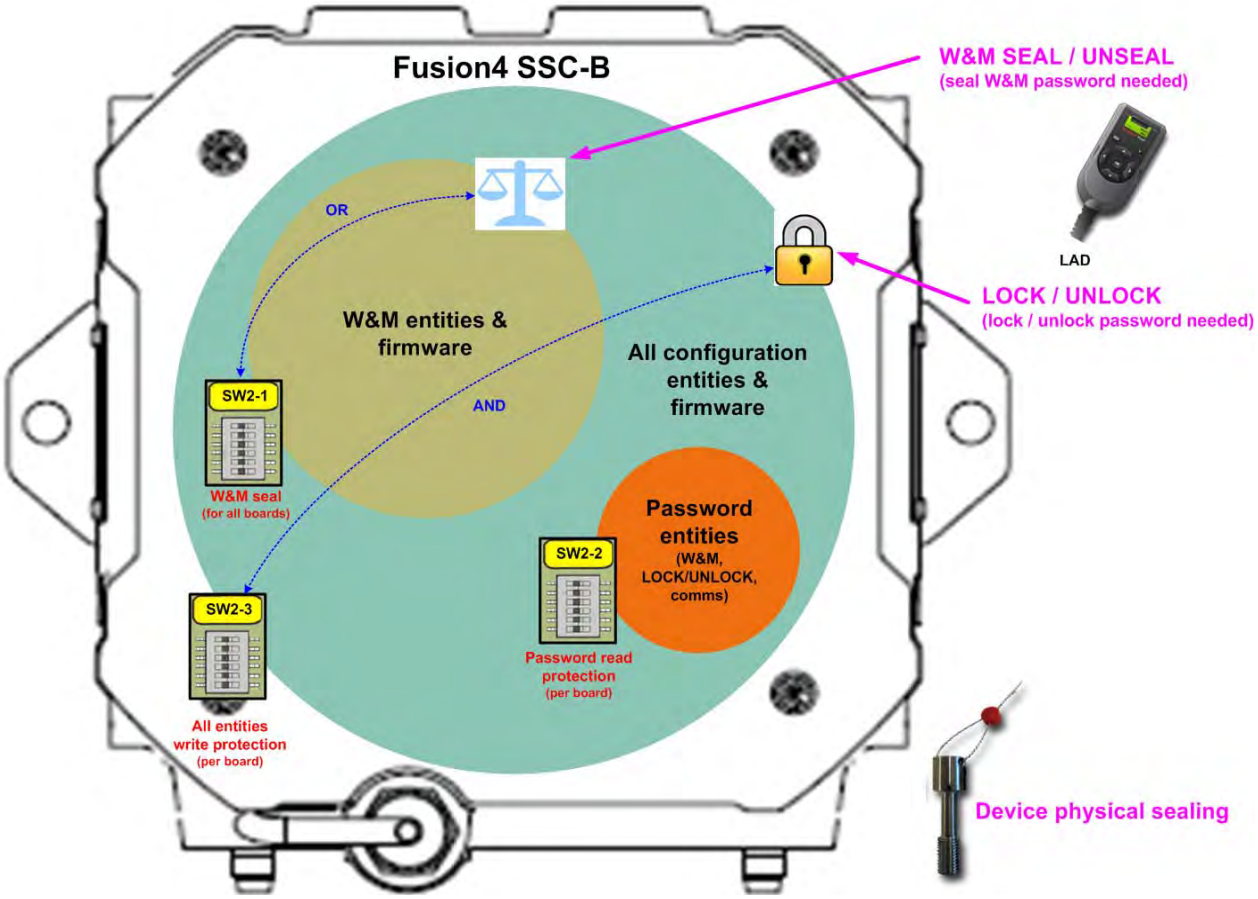


FIGURE 4-9 Possible sealing methods

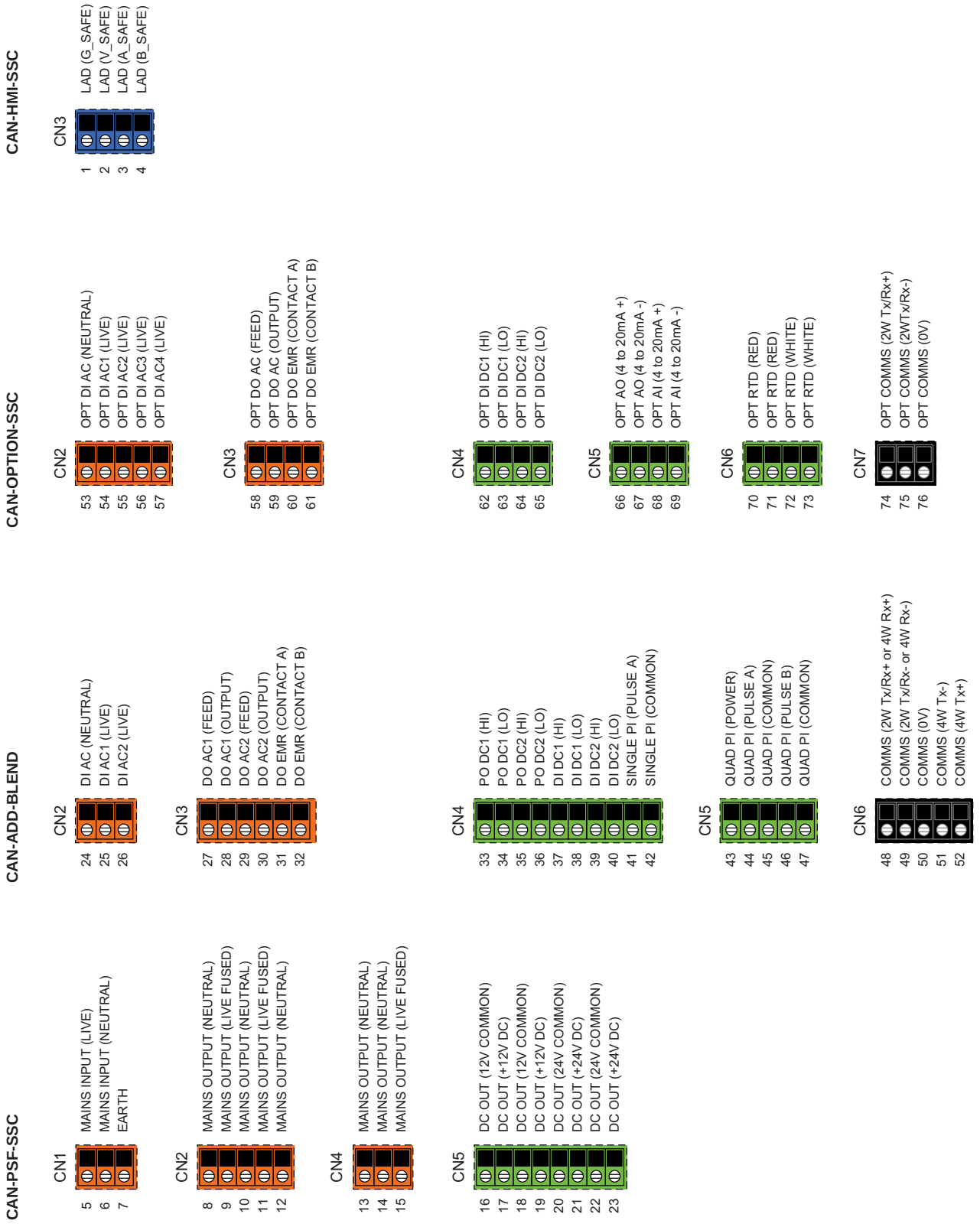
4.9.2 Protected Items

The following configuration entities of the SSC-B are protected by “physical” and “software” sealing:

Entity name	Entity description	Default setting	Location
Temperature unit	Unit of temperature used to display temperature values	DIMENSION_CELCIUS	CAN-HMI-SSC
Temperature scale	Temperature scale	ITS_90	
Volume unit	Unit of volume used to display volume values	LITRES	
Pressure unit	Unit of pressure used to display pressure values	DIMENSION_PASCAL	
Density unit	Unit of density used to display density values	DIMENSION_KILOGRAM_M3	
Display language	User display language	ENGLISH_US	
Local language table	Local language string definitions (unicode)		
Mass Units	Units of mass used on SSC	DIMENSION_KILOGRAM	
Format flash	Format of transaction flash and fram		
Reference temperature	Reference temperature	{15.0, DIMENSION_CELCIUS}	
VCF table	Volume correction table	ASTM_D_1250_04_53_54	
Reference pressure	Reference pressure	{0.0, DIMENSION_KILO_PASCAL}	
Commodity group	Commodity group	COMMODITY_GROUP_REFINED_PRODUCTS	
Temperature compensation used	Temperature compensation used	False	
Pressure compensation used	Pressure compensation used	False	
Injection volume units	Injection volume units	INJECTION_VOLUME_ML	
VCF Options	VCF Options	VCF_TABLE_OPTIONS_EXTENDED_RANGES	

Entity name	Entity description	Default setting	Location
primary stream meter factor	Primary stream meter factor	1.0	CAN-ADD-BLEND
Primary stream k factor	Primary stream k factor	750.0	
Secondary stream k factor	Secondary stream k factor	100.0	
secondary stream meter factor	secondary stream meter factor	1.0	
Quad pulse integrity check	Quad pulse integrity check	DISABLE	
Quad pulse cut off frequency	Quad pulse cut off frequency	50.0	
VCF calculation interval volume	VCF calculation interval volume	100.0	
IO binding main stream volume	IO binding - Main stream volume	QPI	
IO binding side stream volume	IO binding - Blend stream volume	SPI	
IO binding side stream temperature	IO binding - Blend stream temperature	None	
IO binding side stream pressure	IO binding - Blend stream pressure	None	
Derive manual status	Derive manual status	DISABLE	
Lower boundary value	PV value displayed with input == 4 mA	0	CAN-OPTION-SSC
Upper boundary value	PV value displayed with input == 20 mA	100	
flexconn instrument address	FlexConn instrument address	0	CAN-ADD-BLEND & CAN-OPTION-SSC
broadcast address	Broadcast address	998	
unit address	Unit address	123	

4.9.3 Board Connectors Overview



4.10 Terminal Assignment Guide

- The following tables offer a suggested guide for basic function assignment to specific terminals.
- The majority of the SSC-B functions can be assigned to multiple I/O.
- To complete the installation, bind each function to its I/O in the Configuration Menu (see *5.11.2.3 - Display*).

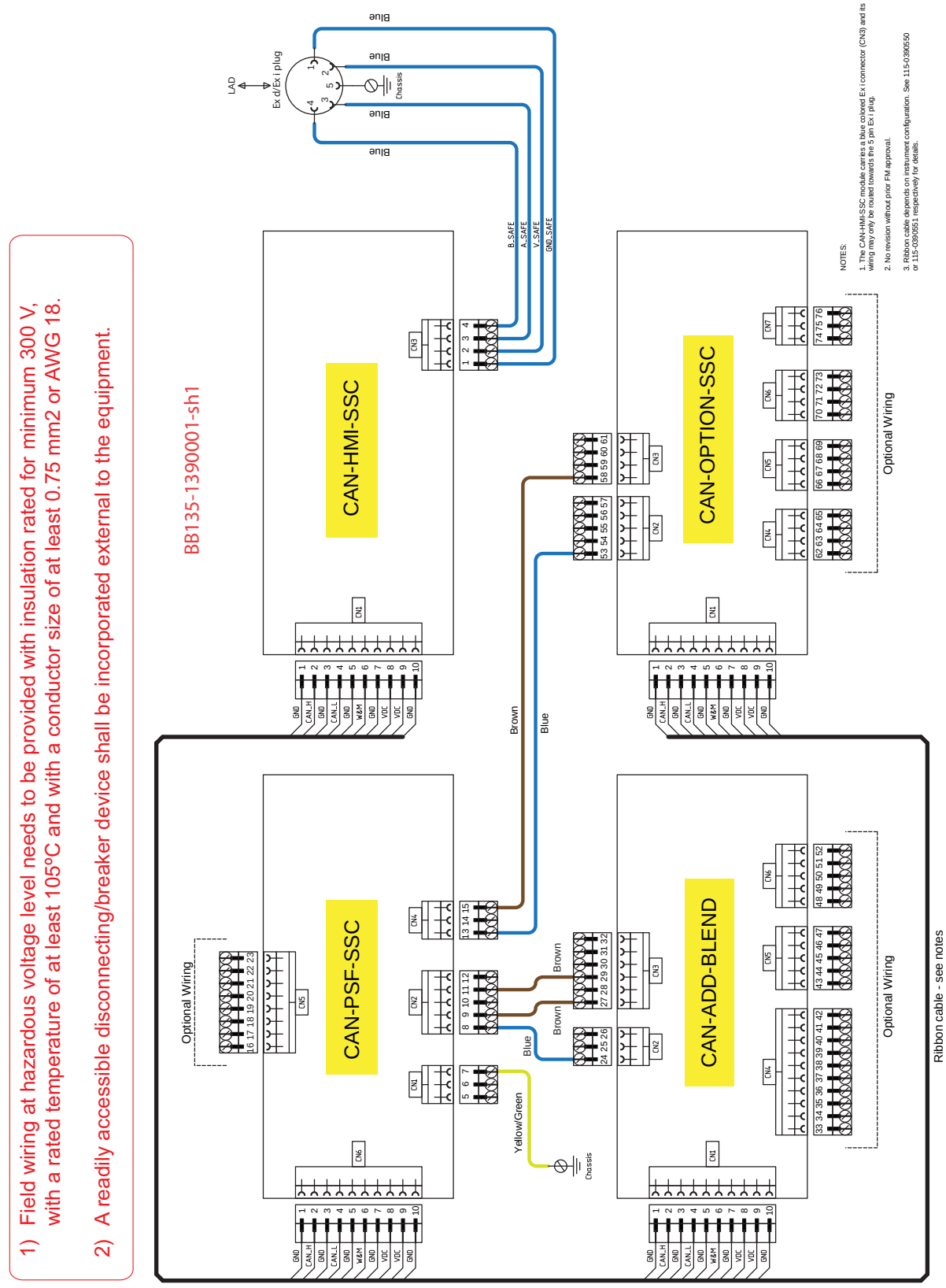
4.10.1 CAN-ADD-BLEND

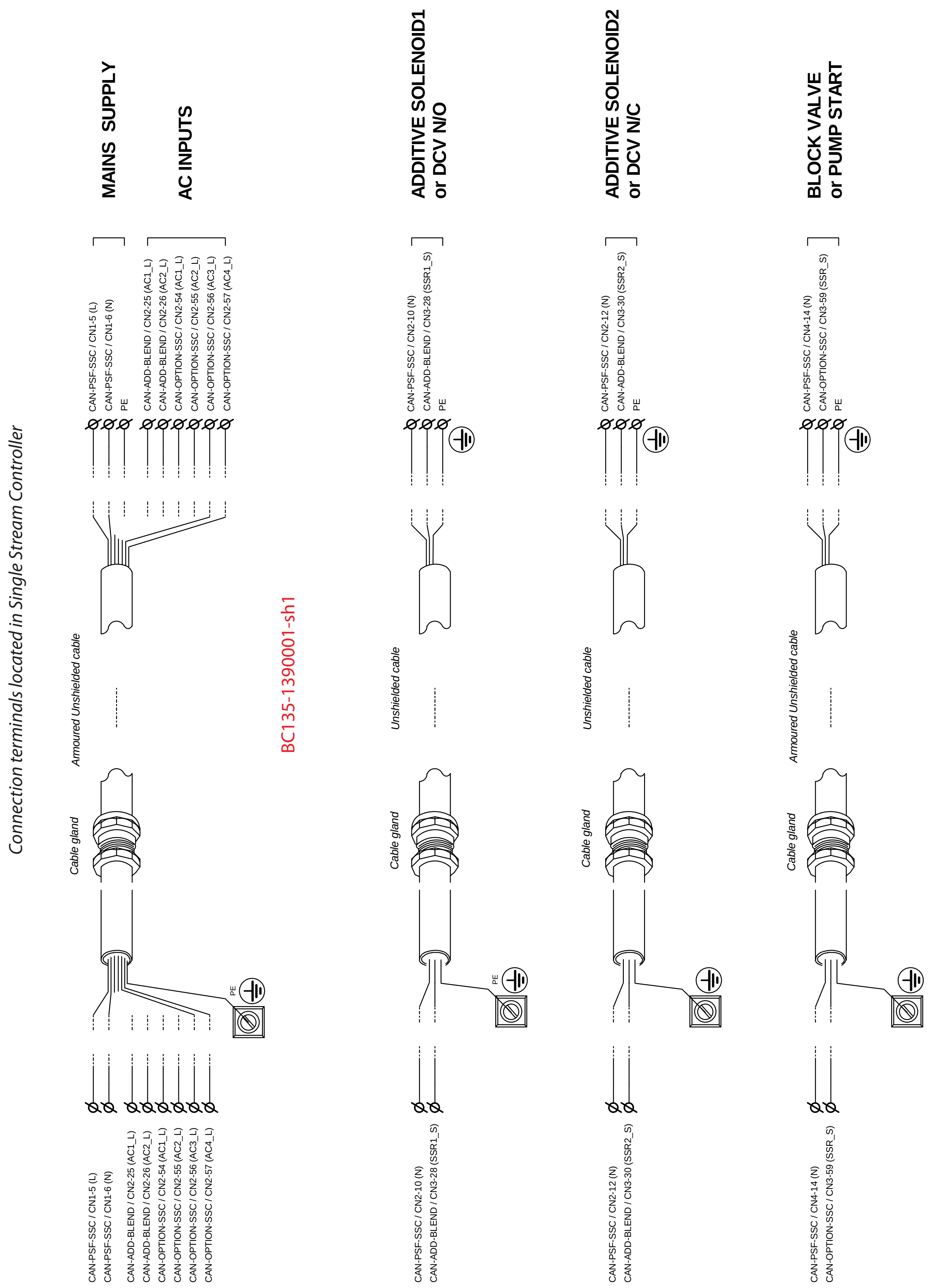
Terminal	ID	SUGGESTED	OPTIONS
CN2			
24	DI-AC	Common Neutral	*Pre-installed for For Fusion4 BioBlend*
25	DI-AC1	**Blend Rate Permissive**	Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank Low Level, Tank Empty
26	DI-AC2	**Alarm Reset**	Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank Low Level, Tank Empty
CN3			
27	DO-AC1	Feed	*Pre-installed for For Fusion4 BioBlend Neutral - PSF, CN2, Terminal 10*
28	DO-AC1	**DCV N.O.**	
29	DO-AC2	Feed	*Pre-installed for For Fusion4 BioBlend Neutral - PSF, CN2, Terminal 12*
30	DO-AC2	**DCV N.C.**	
31	DO-EMR (Contact A)	**Alarm Shutdown**	Alarm Indication, Pump Start, Hydr Pump Start, Add. Block Valve
32	DO-EMR (Contact B)		
CN4			
33	PO DC1 (Hi)		Pump Start, Alarm Indication, Alarm Shutdown, Factored Pulse Out
34	PO DC1 (Lo)		
35	PO DC2 (Hi)		Pump Start, Alarm Indication, Alarm Shutdown, Factored Pulse Out
36	PO DC2 (Lo)		
37	DI DC1 (Hi)		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank Low Level, Tank Empty
38	DI DC1 (Lo)		
39	DI DC2 (Hi)		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank Low Level, Tank Empty
40	DI DC2 (Lo)		
41	Single PI (Pulse A)	**Pacing Source**	
42	Single PI (Common)		
CN5			
43	Quad PI (Power)	**Blend Flow Meter (single)**	*Pre-installed for For Fusion4 BioBlend*
44	Quad PI (Pulse A)		
45	Quad PI (Common)		
46	Quad PI (Pulse B)	**Blend Flow Meter (dual)**	
47	Quad PI (Common)		
CN6			
48	Comms (2W+)	**RS 485 2 Wire**	
49	Comms (2W-)		
50	Comms (0V)		
51	Comms (4W-)	**RS 485 4 Wire**	
52	Comms (4W+)		

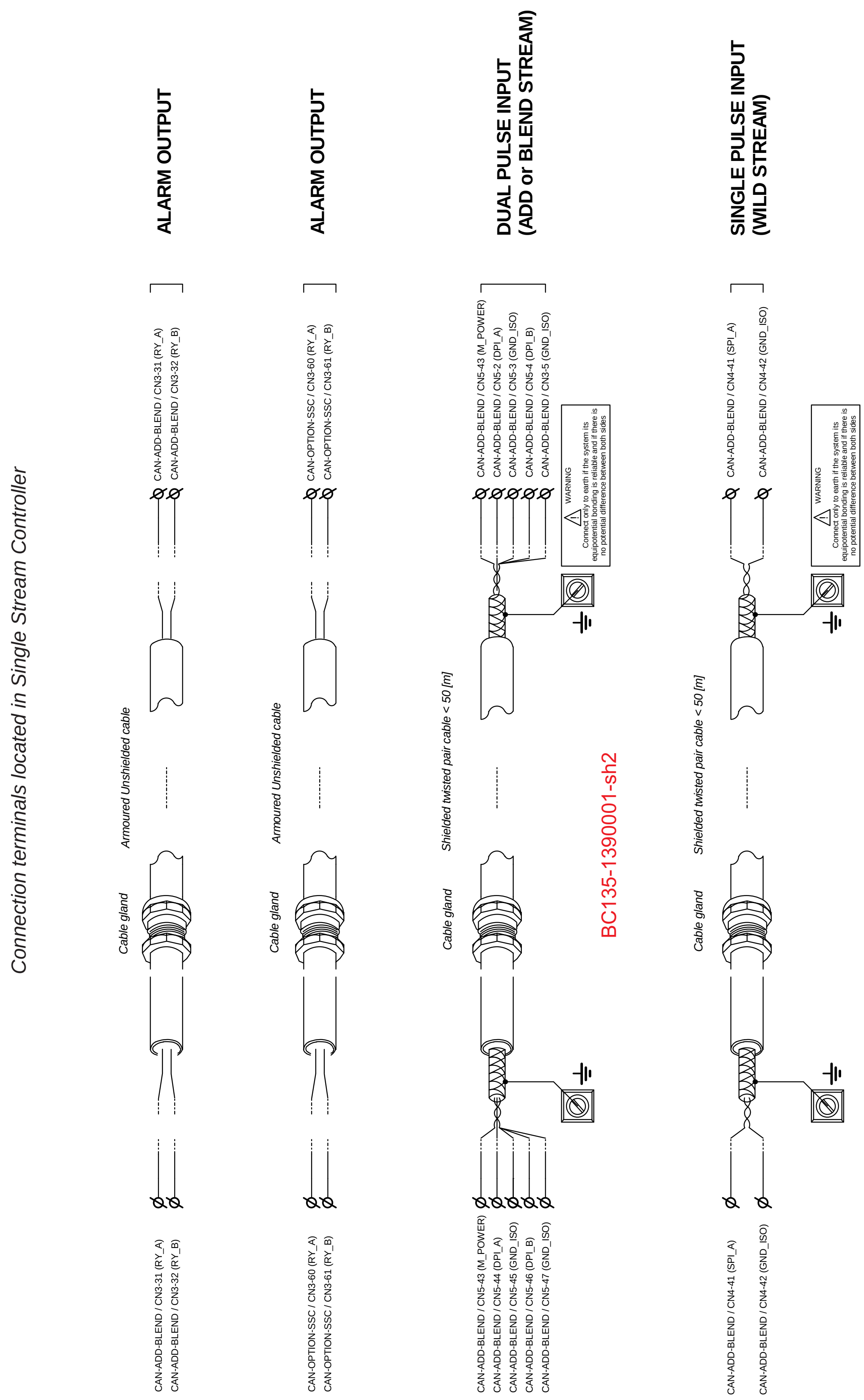
4.10.2 CAN-OPTION-SSC

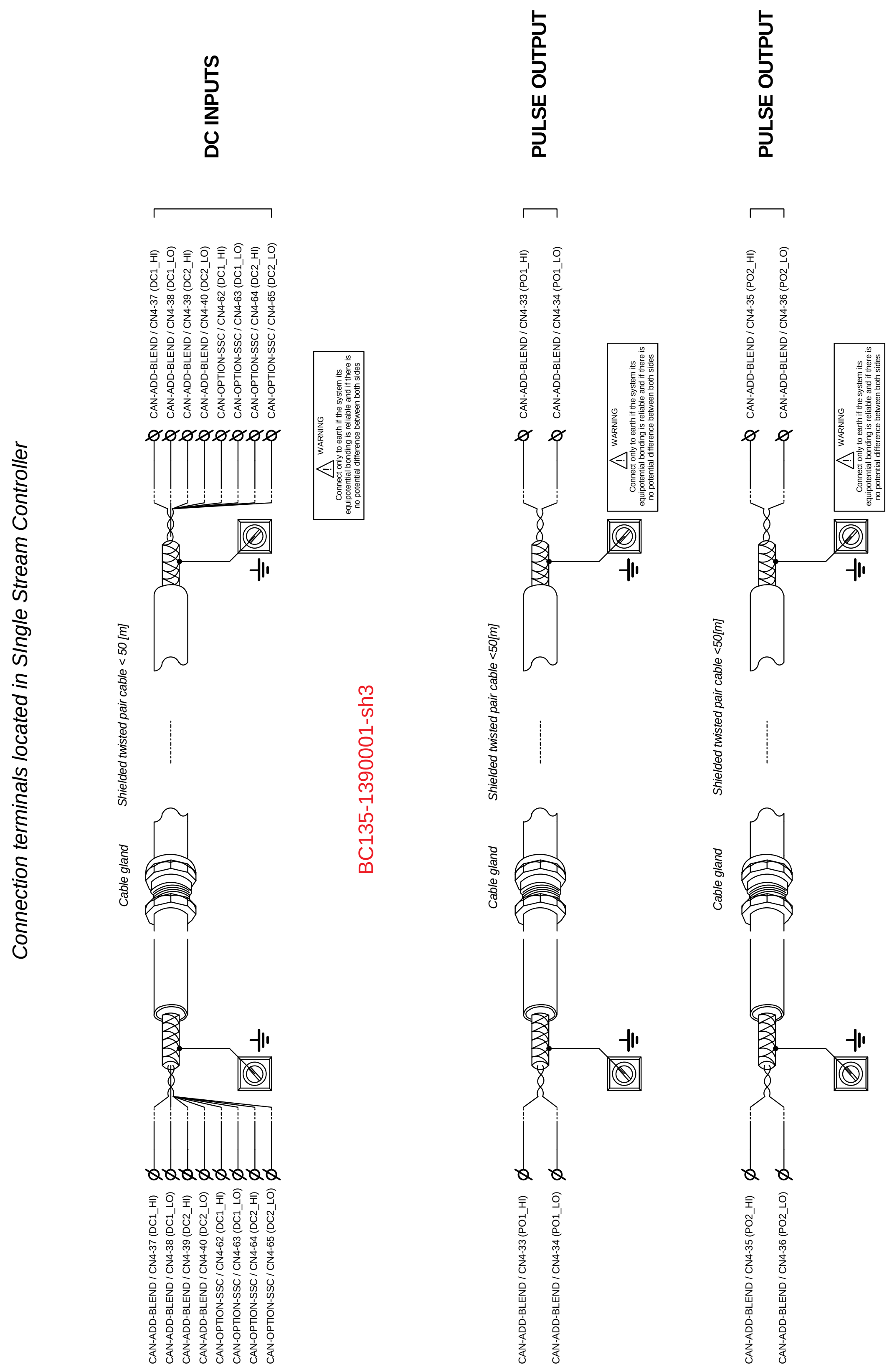
Terminal	ID	SUGGESTED	OPTIONS
CN2			
53	OPT DI-AC	Common Neutral	*Pre-installed for For Fusion4 BioBlend*
54	OPT DI-AC1		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
55	OPT DI-AC2		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
56	OPT DI-AC3		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
57	OPT DI-AC4		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
CN3			
58	OPT DO-AC1	Feed	*Pre-installed for For Fusion4 BioBlend Neutral - PSF, CN4, Terminal 14*
59	OPT DO-AC1		Alarm Indication, Alarm Shutdown, Pump Start, Hydr Pump Start, Block Valve
60	OPT DO-EMR (Contact A)		Alarm Indication, Alarm Shutdown, Pump Start, Hydr Pump Start, Block Valve
61	OPT DO-EMR (Contact B)		
CN4			
62	OPT DI DC1 (Hi)		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
63	OPT DI DC1 (Lo)		
64	OPT DI DC2 (Hi)		Blend Rate Permissive (1,2 or 3), Alarm Reset, Hydr. Pump Feedback, Pump Feedback, System Interlock, Tank LowLevel, Tank Empty
54	OPT DI DC2 (Lo)		
CN5			
66	OPT AO (4-20mA+)		Blend stream volume, Blend stream flowrate, Wild stream flowrate, Blend percentage, Instantaneous temperature, Average temperature, Instantaneous pressure., Average pressure
67	OPT AO (4-20mA-)		
68	OPT AI (4-20mA+)		Temperature Sensor, Pressure Sensor
69	OPT AI (4-20mA-)		
CN6			
70	OPT RTD (red)	RTD Temp Probe	*Pre-installed for For Fusion4 BioBlend*
71	OPT RTD (red)		
72	OPT RTD (white)		
73	OPT RTD (white)		
CN7			
74	Comms (2W+)		Comms
75	Comms (2W-)		
76	Comms (0V)		

4.11 Internal Wiring Diagram

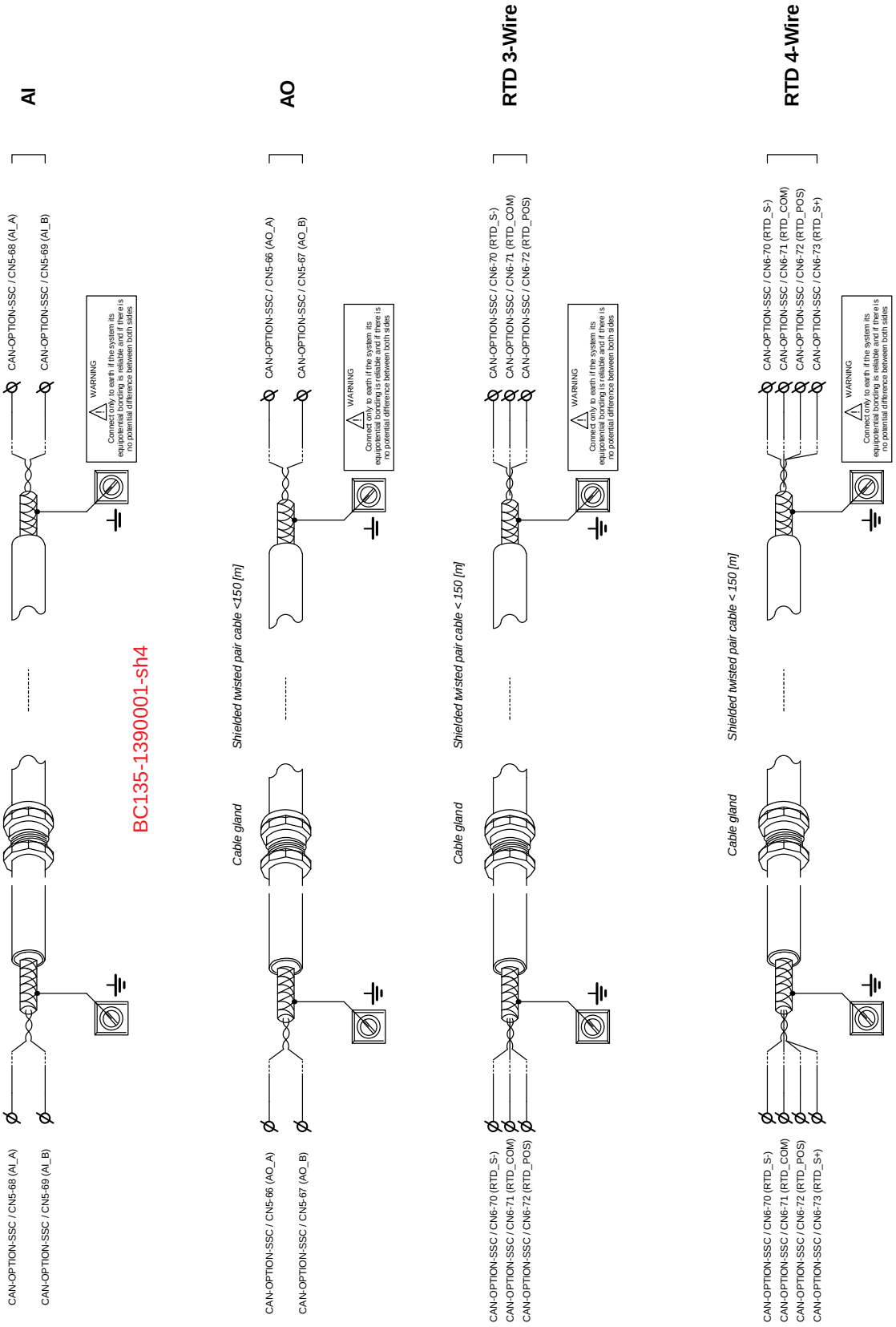


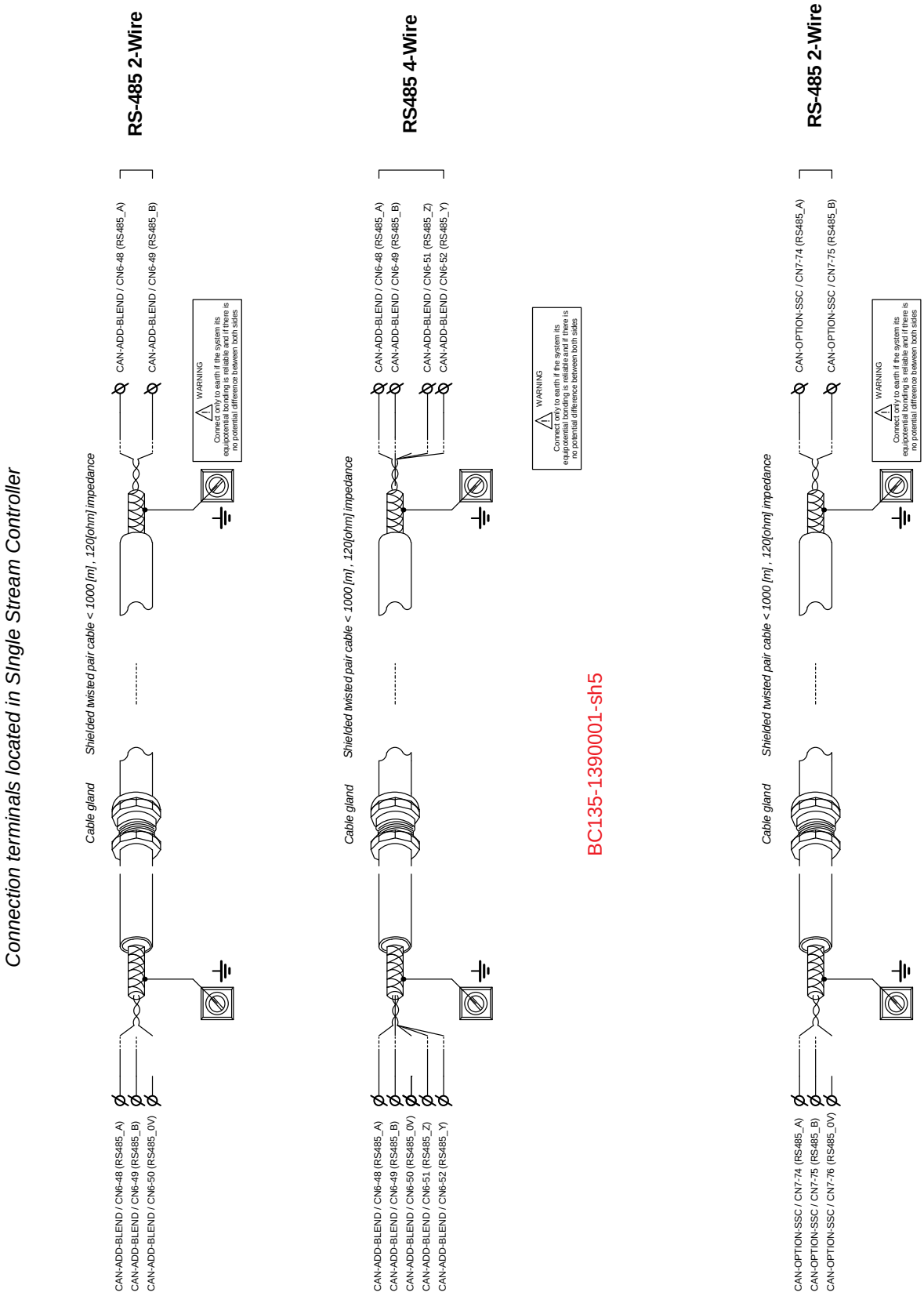

Connection terminals located in Single Stream Controller
Cable gland
Armoured Unshielded cable
CAN-PSF-SSC / CN1-5 (L)
CAN-PSF-SSC / CN1-6 (N)
PE
CAN-ADD-BLEND / CN2-25 (AC1_L)
CAN-ADD-BLEND / CN2-26 (AC2_L)
CAN-OPTION-SSC / CN2-54 (AC1_L)
CAN-OPTION-SSC / CN2-55 (AC2_L)
CAN-OPTION-SSC / CN2-56 (AC3_L)
CAN-OPTION-SSC / CN2-57 (AC4_L)
MAINS SUPPLY
AC INPUTS
BC135-1390001-sh1
Cable gland
Unshielded cable
CAN-PSF-SSC / CN2-10 (N)
CAN-ADD-BLEND / CN3-28 (SSR1_S)
PE
ADDITIVE SOLENOID1
or DCV N/O
Cable gland
Unshielded cable
CAN-PSF-SSC / CN2-12 (N)
CAN-ADD-BLEND / CN3-30 (SSR2_S)
PE
ADDITIVE SOLENOID2
or DCV N/C
Cable gland
Armoured Unshielded cable
CAN-PSF-SSC / CN4-14 (N)
CAN-OPTION-SSC / CN3-59 (SSR_S)
PE
BLOCK VALVE
or PUMP START


Connection terminals located in Single Stream Controller
Cable gland
Armoured Unshielded cable
CAN-ADD-BLEND / CN3-31 (RY_A)
CAN-ADD-BLEND / CN3-32 (RY_B)
ALARM OUTPUT
Cable gland
Armoured Unshielded cable
CAN-OPTION-SSC / CN3-60 (RY_A)
CAN-OPTION-SSC / CN3-61 (RY_B)
ALARM OUTPUT
Cable gland
Shielded twisted pair cable < 50 [m]
CAN-ADD-BLEND / CN5-43 (M_POWER)
CAN-ADD-BLEND / CN5-44 (DPI_A)
CAN-ADD-BLEND / CN5-45 (GND_ISO)
CAN-ADD-BLEND / CN5-46 (DPI_B)
CAN-ADD-BLEND / CN5-47 (GND_ISO)
CAN-ADD-BLEND / CN5-43 (M_POWER)
CAN-ADD-BLEND / CN5-2 (DPI_A)
CAN-ADD-BLEND / CN5-3 (GND_ISO)
CAN-ADD-BLEND / CN5-4 (DPI_B)
CAN-ADD-BLEND / CN3-5 (GND_ISO)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides
DUAL PULSE INPUT
(ADD or BLEND STREAM)
BC135-1390001-sh2
Cable gland
Shielded twisted pair cable < 50 [m]
CAN-ADD-BLEND / CN4-41 (SPI_A)
CAN-ADD-BLEND / CN4-42 (GND_ISO)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides
SINGLE PULSE INPUT
(WILD STREAM)


Connection terminals located in SIngle Stream Controller
DC INPUTS
PULSE OUTPUT
PULSE OUTPUT
Cable gland
Shielded twisted pair cable < 50 [m]
Shielded twisted pair cable <50[m]
Shielded twisted pair cable <50[m]
CAN-ADD-BLEND / CN4-37 (DC1_HI)
CAN-ADD-BLEND / CN4-38 (DC1_LO)
CAN-ADD-BLEND / CN4-39 (DC2_HI)
CAN-ADD-BLEND / CN4-40 (DC2_LO)
CAN-OPTION-SSC / CN4-62 (DC1_HI)
CAN-OPTION-SSC / CN4-63 (DC1_LO)
CAN-OPTION-SSC / CN4-64 (DC2_HI)
CAN-OPTION-SSC / CN4-65 (DC2_LO)
CAN-ADD-BLEND / CN4-33 (PO1_HI)
CAN-ADD-BLEND / CN4-34 (PO1_LO)
CAN-ADD-BLEND / CN4-35 (PO2_HI)
CAN-ADD-BLEND / CN4-36 (PO2_LO)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides
BC135-1390001-sh3

Connection terminals located in SIngle Stream Controller




Connection terminals located in SIngle Stream Controller
RS-485 2-Wire
Cable gland
Shielded twisted pair cable < 1000 [m] , 120[ohm] impedance
CAN-ADD-BLEND / CN6-48 (RS485_A)
CAN-ADD-BLEND / CN6-49 (RS485_B)
CAN-ADD-BLEND / CN6-50 (RS485_0V)
CAN-ADD-BLEND / CN6-48 (RS485_A)
CAN-ADD-BLEND / CN6-49 (RS485_B)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides
RS485 4-Wire
Cable gland
Shielded twisted pair cable < 1000 [m] , 120[ohm] impedance
CAN-ADD-BLEND / CN6-48 (RS485_A)
CAN-ADD-BLEND / CN6-49 (RS485_B)
CAN-ADD-BLEND / CN6-50 (RS485_0V)
CAN-ADD-BLEND / CN6-51 (RS485_Z)
CAN-ADD-BLEND / CN6-52 (RS485_Y)
CAN-ADD-BLEND / CN6-48 (RS485_A)
CAN-ADD-BLEND / CN6-49 (RS485_B)
CAN-ADD-BLEND / CN6-51 (RS485_Z)
CAN-ADD-BLEND / CN6-52 (RS485_Y)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides
BC135-1390001-sh5
RS-485 2-Wire
Cable gland
Shielded twisted pair cable < 1000 [m] , 120[ohm] impedance
CAN-OPTION-SSC / CN7-74 (RS485_A)
CAN-OPTION-SSC / CN7-75 (RS485_B)
CAN-OPTION-SSC / CN7-76 (RS485_0V)
CAN-OPTION-SSC / CN7-74 (RS485_A)
CAN-OPTION-SSC / CN7-75 (RS485_B)
WARNING
Connect only to earth if the system its equipotential bonding is reliable and if there is no potential difference between both sides

CHAPTER 5 OPERATION

5.1 General

5.1.1 Introduction

This chapter gives commissioning information for the SSC-B.

Commissioning the SSC-B is carried out by configuring entities (or parameters) to the desired specific values. This is done through the Menu functions of the SSC-B (See 5.4 - Menu and Navigation).

5.1.2 Text Conventions

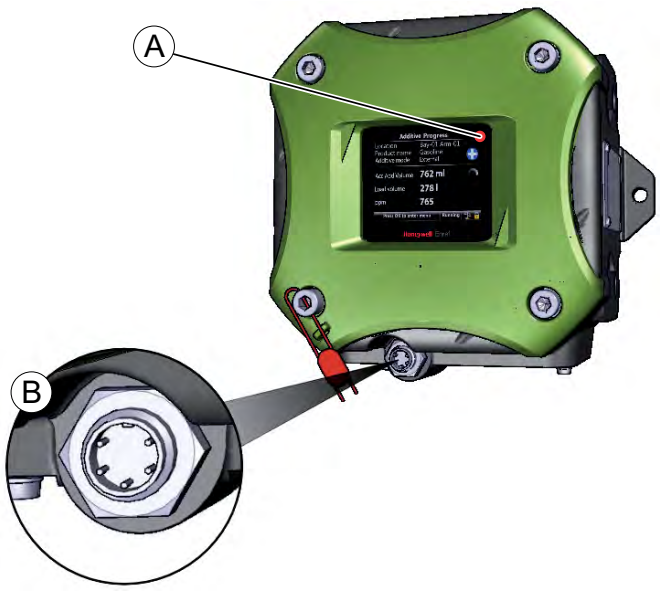
In contrast with explanatory text, all *instruction* text is preceded by a ➔.

All [Entity] and <entity-related> text is recognizably formatted.

5.2 Service Interfaces

The SSC-B can be configured through three interfaces:

- Through the infrared interface (see A, FIGURE 5-1) by using the Fusion4 IR Controller.
- Through the wired Ex i interface (see B, FIGURE 5-1) with a LAD.
- Through the RS-485 communication.



F4A10-0008

FIGURE 5-1 Service interfaces of the SSC-B

5.3 Service Tools

5.3.1 Fusion4 IR Controller

The Fusion4 IR Controller uses infrared (IR) signals to transmit ASCII characters to the SSC-B. This allows the operator to make adjustments in programming without removing the cover of the explosion-proof enclosure on-site.

The infrared receiver on the SSC-B is designed to be insensitive to interference from light sources other than the Fusion4 IR controller. All prompts requiring an operator response are clearly indicated on the display of the SSC-B.

The Fusion4 IR controller has all of the infrared commands permanently stored in its micro-controller. Because of this, once the batteries are flat, it can be restored to full operation by inserting a fresh set of batteries. The Fusion4 IR controller has a “sleep” mode to reduce battery consumption. At first use, or after a period of inactivity of approximately 30 seconds, the **[ATTN]** key must be pressed to “wake-up” the Fusion4 IR controller. Then the **[SEND]** light blinks, indicating that the Fusion4 IR controller is ready for operation.

The Fusion4 IR controller is approved (ATEX) for use in hazardous atmospheres (not detailed here).

The SSC only uses 7 of the Fusion4 IR controller buttons. These buttons are the ones with the bold text in FIGURE 5-2.

FIGURE 5-2 The key functions of the Fusion4 IR controller

REMARKS:
1. Three AAA batteries are required for operation.
2. Remote control range limited to 3 m/10 ft.
3. The switch mounted on the right hand side (if present) is not functional.

5.3.2 LAD

5.3.2.1 General

The Local Access Device (LAD) is a hand-held controller used to interface with the Fusion4 product family, allowing tasks such as parameter adjustment, alarm resetting, and blender calibration.

The device facilitates two-way data communications between a parent device and the LAD (see 5.2 - Service Interfaces), allowing the rapid transfer of transaction data, configuration files and calibration records, and even firmware upgrading while in the field.

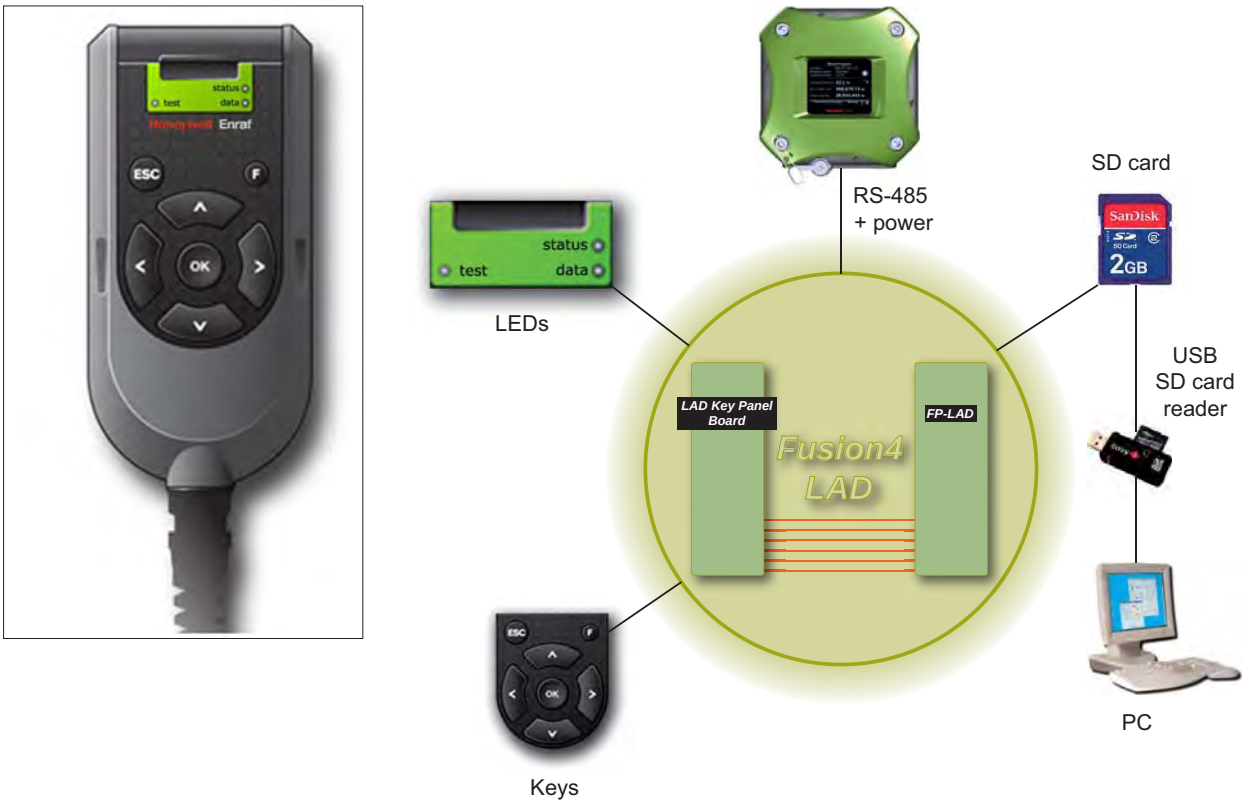


FIGURE 5-3 The LAD and its system overview

5.3.2.2 LAD Application Overview

5.3.3 Navigation with the Fusion4 IR controller and the LAD

5.3.3.1 Basic Navigation (Fusion4 IR controller + LAD)

Basic navigation is identical for both the Fusion4 IR controller and the LAD, see FIGURE 5-4.

Fusion4 IR controller	LAD
	
^ = Up	
V = Down	
< = Left	
> = Right	
OK = Select	
ESC = Back	

FIGURE 5-4 Basic navigation (Fusion4 IR Controller and LAD)

5.3.3.2 LEDs (Fusion4 IR controller + LAD)

<table>
<tr><th colspan="2">Fusion4 IR controller</th><th colspan="2">LAD</th></tr>
<tr><td colspan="2"> 
</td><td colspan="2"> 
</td></tr>
<tr><td>send blinking</td><td>Fusion4 IR controller ready for operation

NOTE: when LED is OFF, push ATTN key to “wake up” the Fusion4 IR controller.</td><td>status (dual-color)</td><td>• green = OK
• red = Fault</td></tr>
<tr><td rowspan="5"></td><td rowspan="5"></td><td>data (amber)</td><td>ON = data transfer

NOTE: do NOT disconnect at data transfer.</td></tr>
<tr><td rowspan="4">test (dual-color)</td><td>• green = mapped I/O function has good health and is active</td></tr>
<tr><td>• red = mapped I/O is inactive</td></tr>
<tr><td>• red (blinking) = mapped I/O has bad health</td></tr>
<tr><td>• off = no I/O mapping exists</td></tr>
</table>

5.3.3.3 Special Function Key (LAD only)

- A **user-defined LAD function** can be mapped to the **F** key.

Examples: Transfer transaction to LAD, bring up diagnostics screen, start calibration wizard.

- You can configure the special function key through the HMI of the Fusion4 device at hand.

NOTE: The LAD special function key may not be applicable for all Fusion4 devices.

5.3.3.4 SD Card

NOTE: Format the SD card before using it for the first time. See section 5.17.5 - Format SD Card for more information about formatting the SD card.

The LAD has an SD card slot located in the top, front face (see FIGURE 5-5).

FIGURE 5-5 SD card location in the LAD (lid opened)

- The SD card uses a *FAT file system* to allow for interoperability with MS Windows platforms.
- The SD card is used for storage of:
  - LAD firmware
  - LAD license key
  - Generic recipes
  - Configuration templates
  - Device firmware
  - Language packs
  - Transaction data
  - Calibration data
  - Configuration data
  - Recipes
  - Alarm logs
  - W&M logs

5.3.3.4.1 Product Type Selection

The selection of an SD card for the LAD is important. Due to the intrinsically safe design of the LAD, the current drawn by the SD card is strictly limited. For this reason, commercially available SD cards are

NOT recommended, as the specification and construction of these devices change frequently.

The following table describes the cards are recommended by Honeywell Enraf.

Manufacturer	Series	Type	Capacity	Part Number
SanDisk	Industrial	SD	2GB	SDSDAA-002G
Swissbit	S-200	SD	1GB	SFSD1024L4BN2SA-E-D1-131-STD
Pretec	Industrial	SD	1GB	SDS001GSBHP
Transcend	Industrial	SDHC	2GB	TS2GSD80I
STEC	Industrial	SD	1GB	SLSD1GBBSIU

It is possible to use SD cards not included in the list above, but they must conform to the following specification.

Type	SD or SDHC
Operating temperature	-20° to +65° [-4 to +149ºF]
Maximum current	70mA

NOTE: Note that Honeywell Enraf does NOT provide support for any cards not listed in the table above. Please contact factory for more information.

NOTE: Note that miniSD and microSD cards fitted in an SD adaptor should NOT be used in the LAD.

5.3.3.4.2 *Directory Structure and Files Organization*

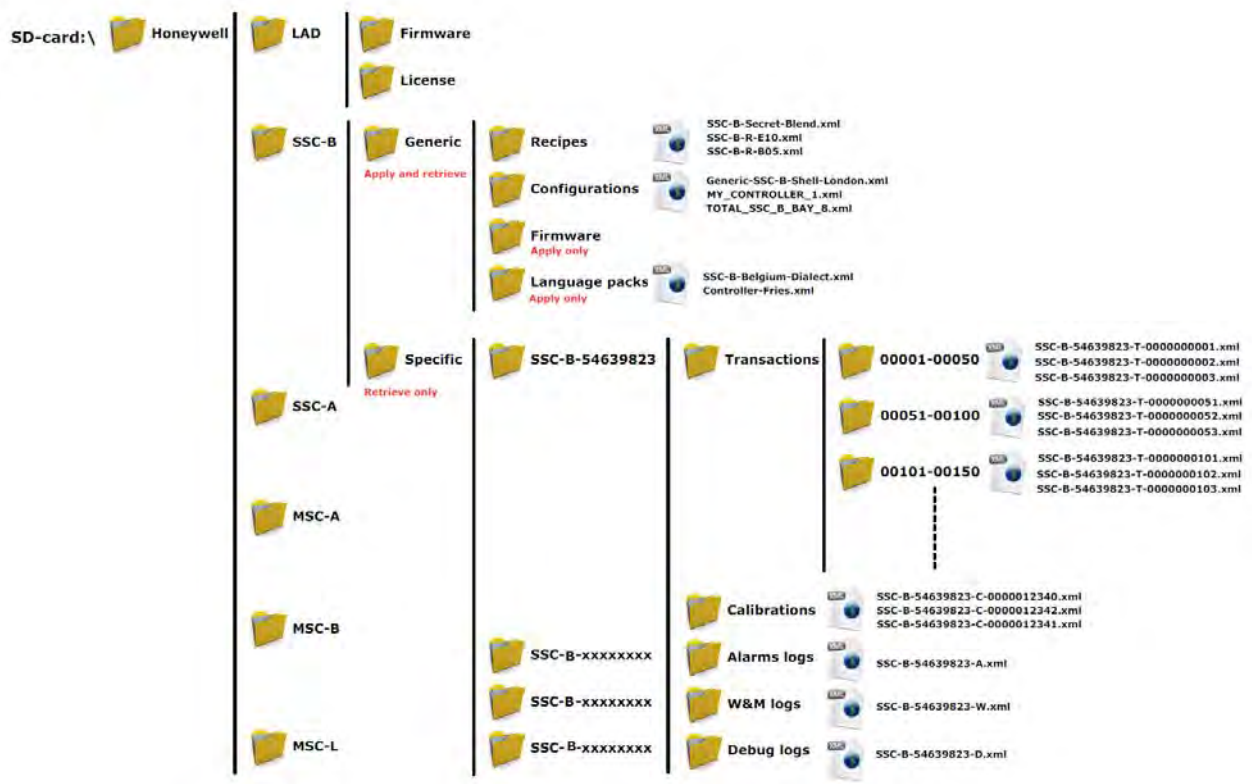


FIGURE 5-6 Directory structure and files organization

5.3.3.4.3 *Guidelines*

- All files have *.xml-format and -extention (except *Firmware* and *License*).
- File name identification (file-id):
  - T = Transactions
  - C = Calibrations
  - A = Alarm logs
  - W = W&M logs
  - D = Debug logs
  - R = for Recipes
- File name format **Transactions:**
  - <device-type>-<serial number>-<file-id>-<transaction-id>.xml
  - Example: **`SSC-B-54639823-T-0123456789.xml`**
- File name format **Calibrations:**
  - <device-type>-<serial number>-<file-id>-<calibration-id>.xml
  - Example: **`SSC-B-54639823-C-0123456789.xml`**

- File name format **Alarm logs:**
  - <device-type>-<serial number>-<file-id>.xml
  - Example: **SSC-B-54639823-A.xml**
- File name format **W&M logs:**
  - <device-type>-<serial number>-<file-id>.xml
  - Example: **SSC-B-54639823-W.xml**
- File name format **Debug logs:**
  - <device-type>-<serial number>-<file-id>.xml
  - Example: **SSC-B-54639823-D.xml**
- File name format **Recipes:**
  - <device-type>-<file-id>-<recipe-name>.xml
  - Example: **SSC-B-R-E20.xml**
- File name format **Configurations:**
  - <user defined string>.xml
  - Example: **MY_CONTROLLER_1.xml**

REMARKS:

1. Generic files built / edited in a PC environment can differ from the above format.

2. Generic files built / edited in a PC environment MUST BE PLACED in the corresponding "Generic" folders, otherwise they cannot be selected during SSC (device) - LAD interaction.

3. Firmware files MUST be placed in the corresponding folders for the LAD and the SSC, otherwise they cannot be selected during SSC (device) - LAD interaction.

5.3.3.4.4 Number of Files

An indication of the typical amount of files that can (at least) be found in the folders is as follows:

\Honeywell\SSC-B\Generic\Recipes	100
\Honeywell\SSC-B\Generic\Configurations	100
\Honeywell\SSC-B\Generic\Firmware	25
\Honeywell\SSC-B\Generic\Language packs	25
\Honeywell\SSC-B\Specific\SSC-B-54639823\Transactions	20,000
\Honeywell\SSC-B\Specific\SSC-B-54639823\Calibrations	100
\Honeywell\SSC-B\Specific\SSC-B-54639823\Alarm logs	1
\Honeywell\SSC-B\Specific\SSC-B-54639823\W&M logs	1
\Honeywell\SSC-B\Specific\SSC-B-54639823\Debug logs	1

5.3.3.4.5 Language Pack Configurable Screens

In the following table, the IDLE- AND RUNNING SCREENS text items are listed that is displayed according to the language that is set with the relevant Language Pack.

LAST TRANSACTION SCREEN	ALARM MESSAGES
Last Transaction	General fail alarm
Location	Power failure
Product name	Communication failure
Blend %	HMI fatal error
Blend volume	Stream board missing
Load volume	Option board missing
Start time	License key failure
End time	Batch permissive failure
Status	Service due reminder
No transaction on controller	Control failure alarm
DAILY TOTAL SCREEN	VCF error alarm
DailyTotals	Pulse phase alarm
Location	Pulse hardware alarm
No. of trans.	Temperature error alarm
Total volume	Pressure error alarm
BLEND PROGRESS SCREEN	Blend percentage alarm
Blend Progress	Leaking valve alarm
Location	Wild stream closing alarm
Product name	Blend stream closing alarm
Target blend %	No activity alarm
Current blend %	Flush volume alarm
Blend volume	Stream failed alarm
Load volume	No pump alarm
ADDITIVE PROGRESS SCREEN	Factored pulse out alarm
Additive Progress	No hydr. pump alarm
Location	Tank low level alarm
Product name	Tank empty alarm
Additive mode	Block valve alarm
ppm	Solenoid failing alarm
Additive volume	No additive alarm
Load volume	Low vol. dev. alarm
STATUS BAR MESSAGES	High vol. dev. alarm
Stopped	ALARM STATUS
Running	Disabled
Idle	Inactive
Paused	Active
Error	Acknowledged

5.3.3.4.6 *Building a Local Language Pack for SSC*

To create a custom language pack for the Single Stream Controller, perform the following steps.

- Open the file **`ssc_local_language_template.xml`** with an XML editor.

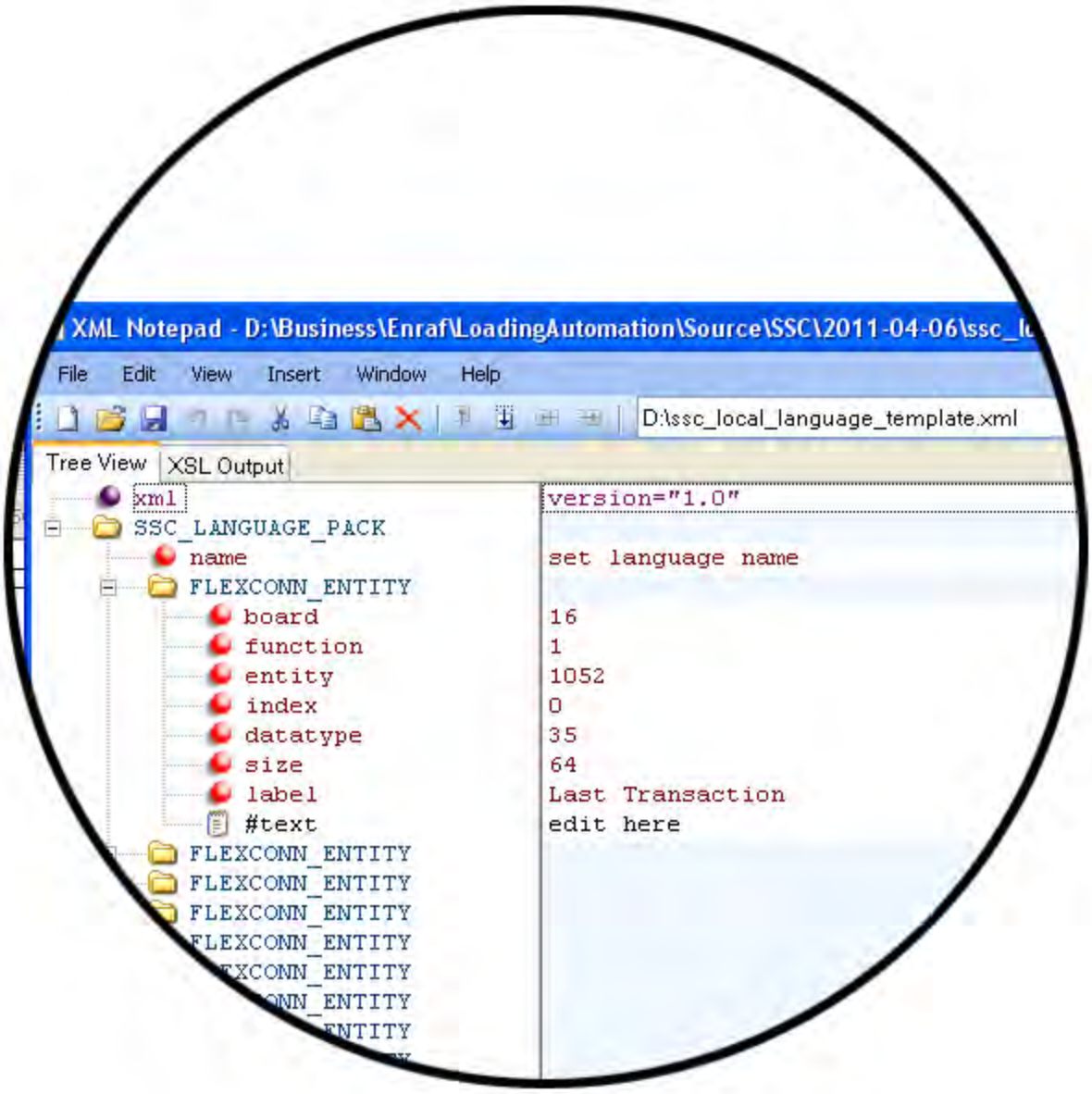
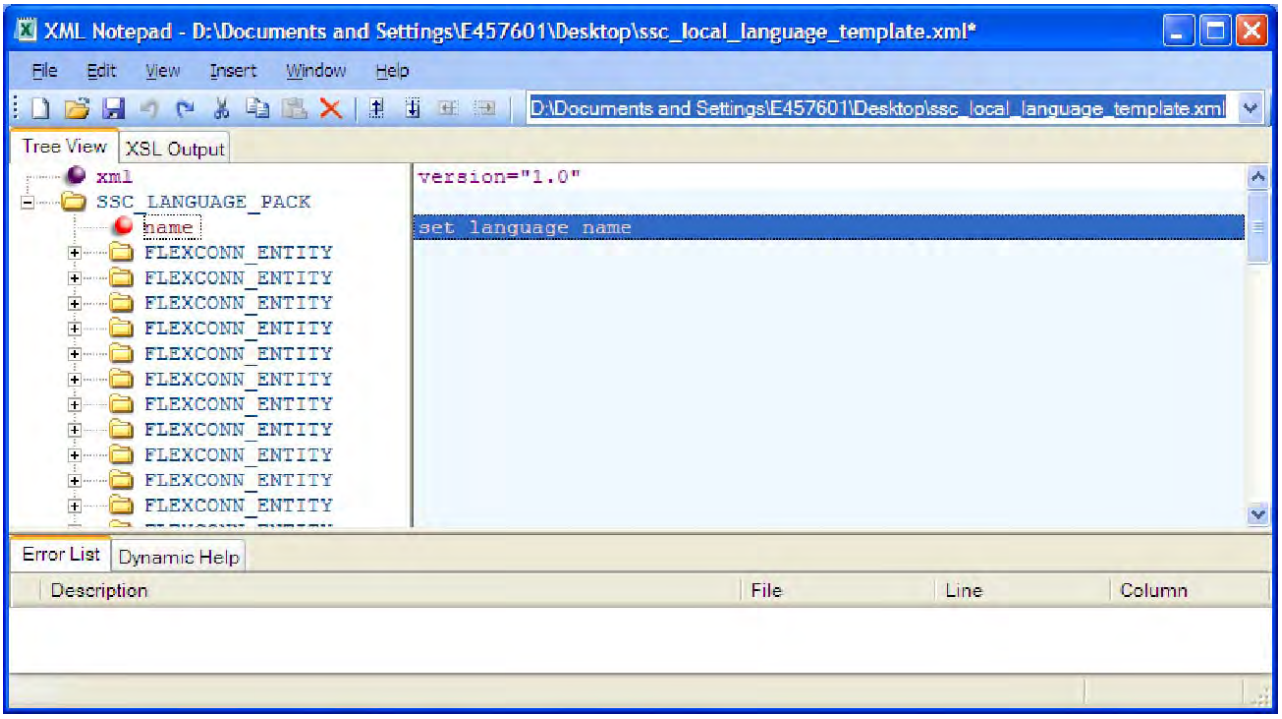


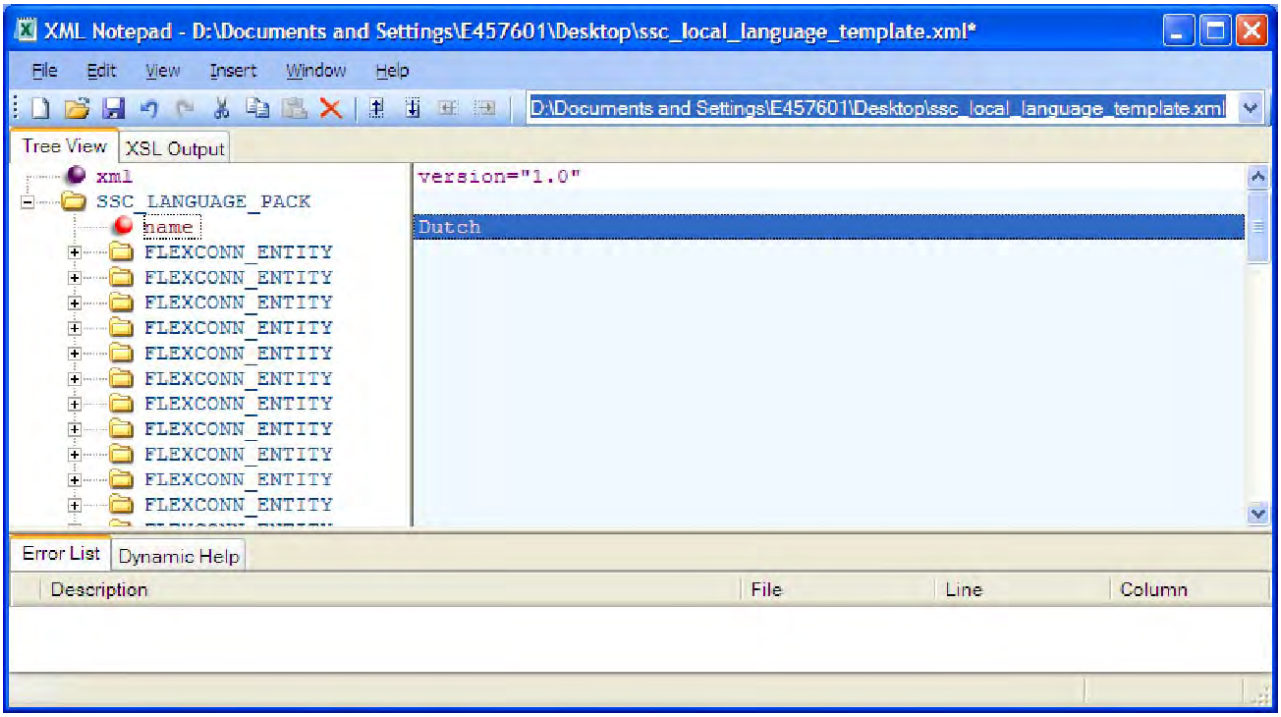
FIGURE 5-7 Screenshot detail of the XML template

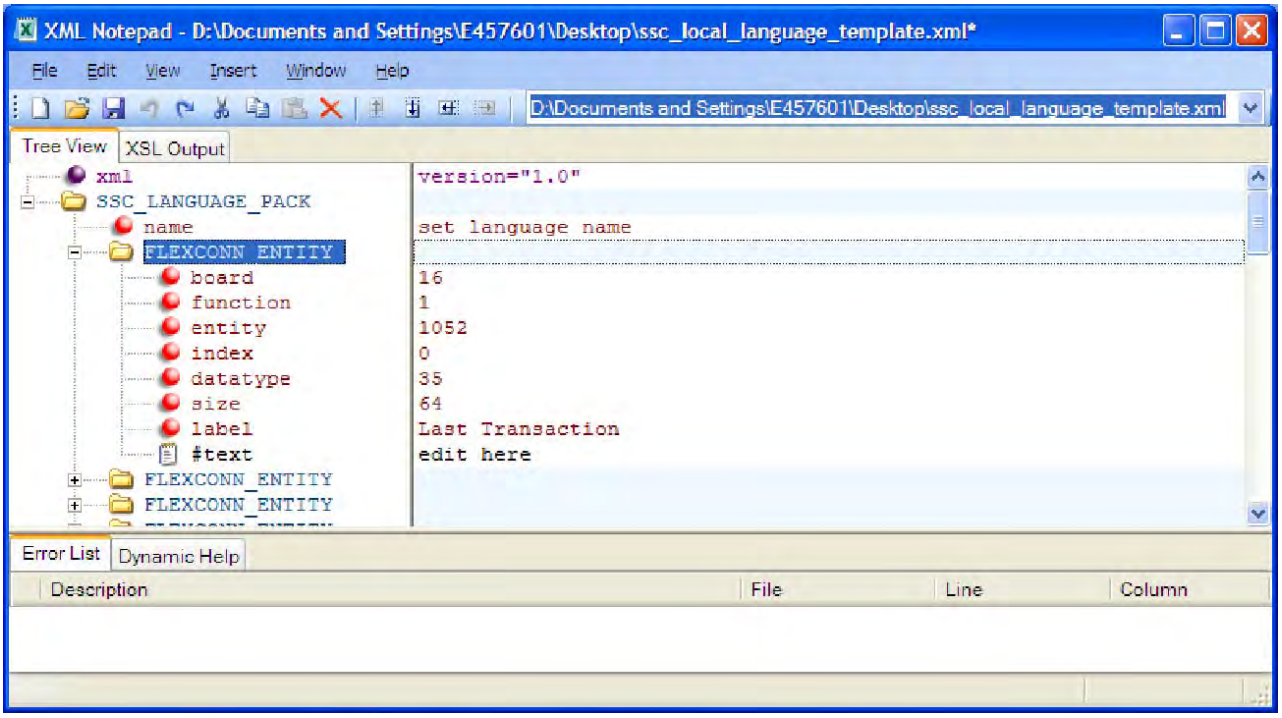
NOTE: This manual shows screenshots from XML Notepad 2007, but any text editor can be used.

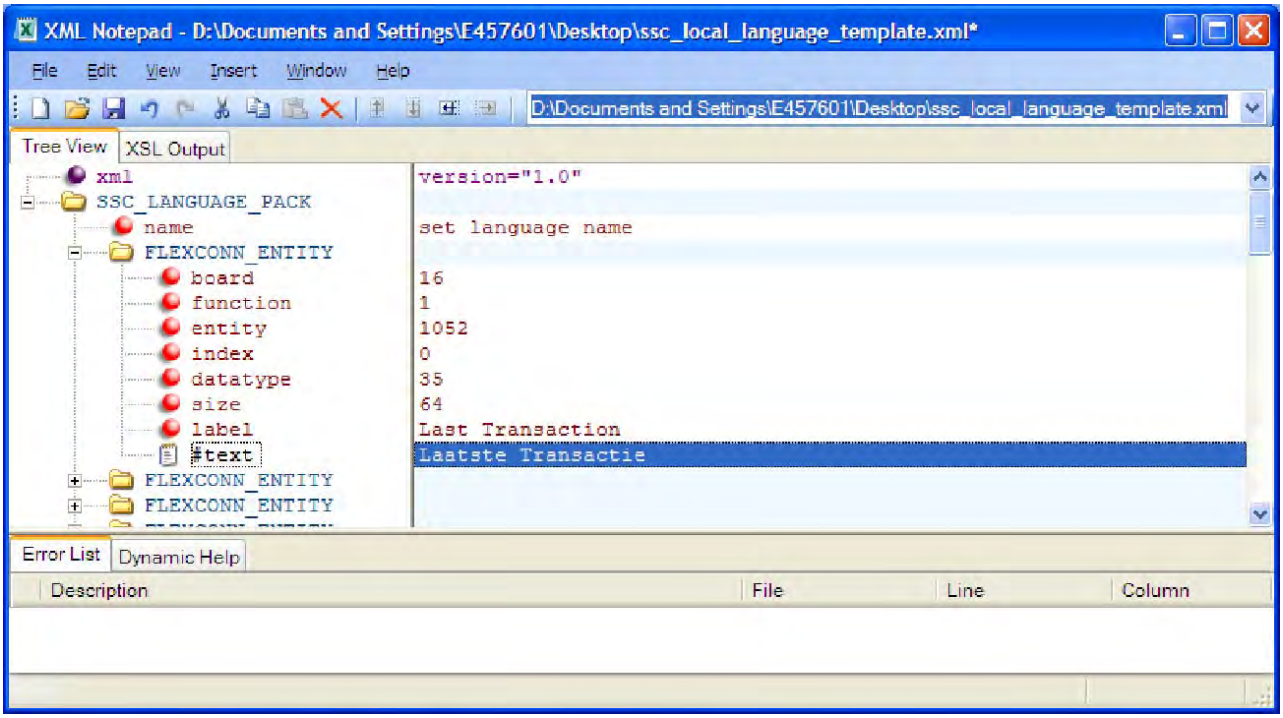
- Replace the text “set language name” with the name of the language.



- Provide a translation for every FLEXCONN_ENTITY instance, by replacing the “edit here” text with the local language. **Do not edit other fields!**







- Save the file and put it on the SD card in: **`Honeywell\SSC-B\Generic\Language packs`**.
- Upload the file to the device.
- Change the “User display language” entity (Configuration → Device → Display → User display language) to “Local Language”.

5.4 Menu and Navigation

5.4.1 General

An intuitive and informative Human Machine Interface (HMI) is available to operate, configure, and service the SSC-B. This menu-based user interface is as clear and accessible as possible, using easily understandable colored icons for the Main Menu and logically structured sub-menus.

5.4.2 Key benefits

- Clean, intuitive, and informative user interface
- No need to memorize parameter codes, enumeration value
- Wizard-based configuration for blend meter calibration
- Flexible I/O configuration
- Diagnostic screens
- Record-based approach to transactions, recipes, and calibrations make re-use possible
- Interoperable with both the Fusion4 IR Controller and the LAD
- Provides a graphical user interface to the LAD

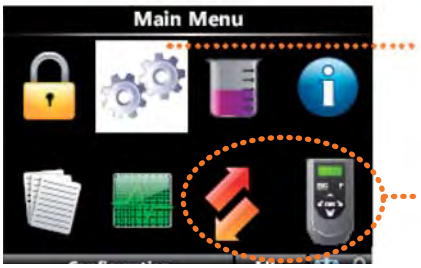
The following sections briefly clarify all main menu items/aspects.

5.4.3 Main Menu

Title

Main Menu icon

Name of selected item



Selected item
(focus rectangle)

Only available
if LAD is connected

5.4.4 Text Input Screen

Title bar

Single line edit field

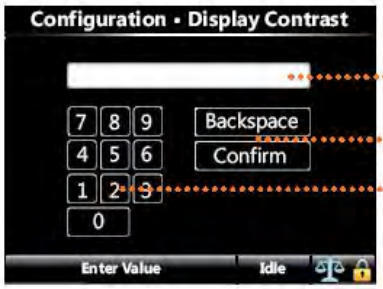
Selected letter

Action message

Numbers grouped

Letters grouped

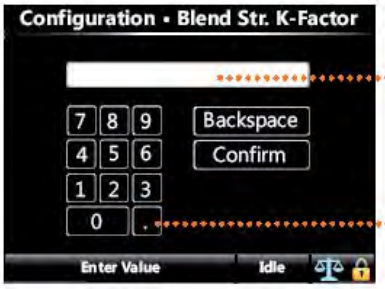
5.4.5 Numeric Input Screen



Single line edit field

Confirm & Backspace buttons

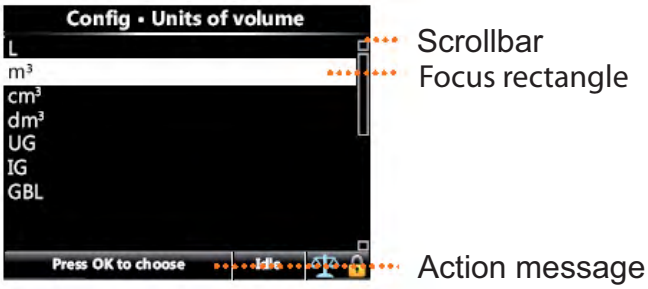
Number buttons



Single line edit field

Point button

5.4.6 Enumeration Input Screen



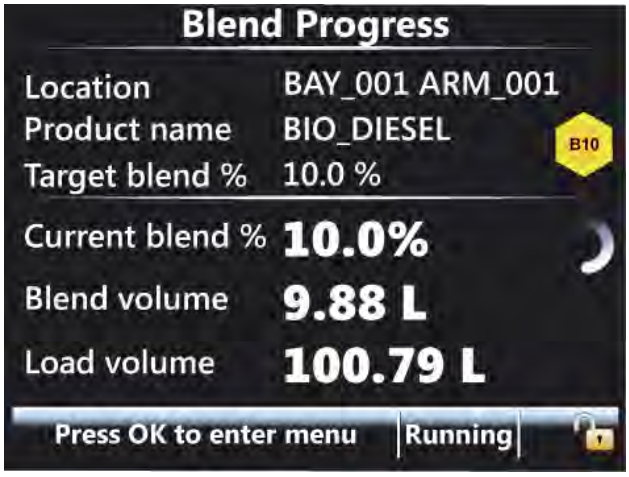
5.4.7 Status Bar

- Always visible on all screens
- Contains the following information:
  - Context-specific information/directions
  - Status of the transactions (for example, Idle, Running, Error)
  - W&M Compliance Icon
  - Device Locking Icon

5.5 Running Screens

5.5.1 Blend Progress

- *During an active transaction*, the following screen appears.



See screen above	Explanation
Target blend %	desired target blend percentage
Current blend %	actual blend percentage
Blend volume	Gross Observed Volume of the blend product
Load volume	Gross Observed Volume of the wild stream

5.5.2 Last Transaction and Daily Totals

- After the *transaction has been stopped*, the SSC toggles each 20 seconds between the "**Last Transaction**" screen and the "**Daily Totals**" screen. See the following screens.
- You can also use the "<" and ">" navigation buttons on the Fusion4 IR controller or LAD to explicitly toggle between these screens.

See screens above	Explanation
Blend %	Actual blend percentage achieved (can differ from the target blend %)
Blend volume	Transactional Gross Observed Volume of the blend stream
Load volume	Transactional Gross Observed Volume of the wild stream
No. of trans.	Number of transactions for that particular day
Total volume	Daily Accumulated Transactional Observed Volume of the blend stream

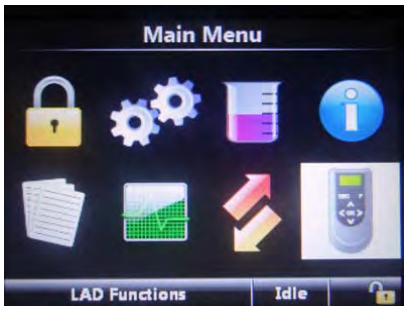
5.6 Transfer

NOTE: Only when the LAD is connected!

- Through this user's interface, the following type of records can be transferred between the SSC and the LAD:
  - transactions
  - calibrations
  - alarms
  - recipes
  - configurations
  - languages

5.7 LAD Functions

NOTE: Only when the LAD is connected!



- This is the user's interface to LAD-specific functionality:
  - Firmware download to the SSC and the LAD
  - Configuration of the LAD's special function key
  - Format SD card
  - W&M sealing
  - Configuration of the Test LED
  - LAD information

5.8 Device Locking

In this screen, you can lock and unlock the SSC-B.

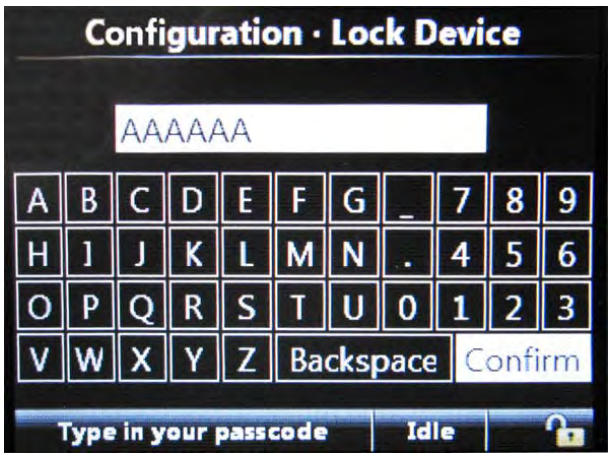
- A single password is used to lock the device from further configuration through HMI.
- Password consists of all characters and the size of the password must be between 1 and 6 characters.
- Device remains unlocked until explicitly locked again.
- Reading the password used for locking the device can be disabled by the jumper JP2.

The "lock status" is shown at the status bar in the bottom right corner (padlock). See the following screen.

When the device is locked, no configuration entities can be changed through the SSC-B menu until you unlock the device again. Also calibration activities, all available tasks and commands, and the clear alarm function are disabled when the device is locked.

When SSC-B is locked, configuration, recipes, and language pack cannot be applied through LAD.

To lock the device, you must enter a password. This password must have a fixed length of 6 characters.



To unlock the device, you must enter the password entered during locking the device.

The password is stored in non-volatile memory.

When the password read is protected by jumper JP2 on the connector X106 of the CAN-HMI-SSC and the password is forgotton, then the jumper should be removed or replaced in order to be able to read the password again (see FIGURE 5-8).

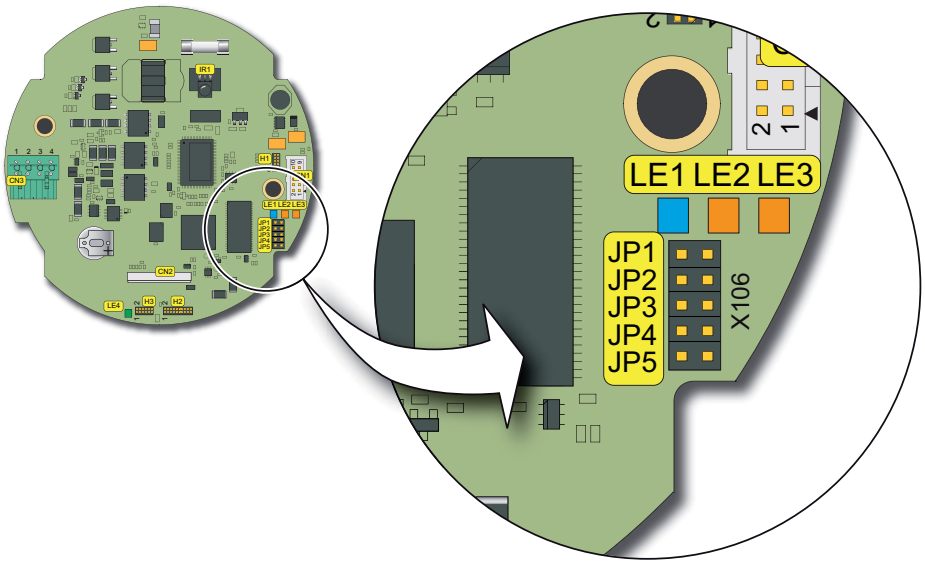


FIGURE 5-8 Lock the device password read protection by jumper JP2

5.9 Device Commissioning

5.9.1 Setup Explanation and Configuring Using the Menu

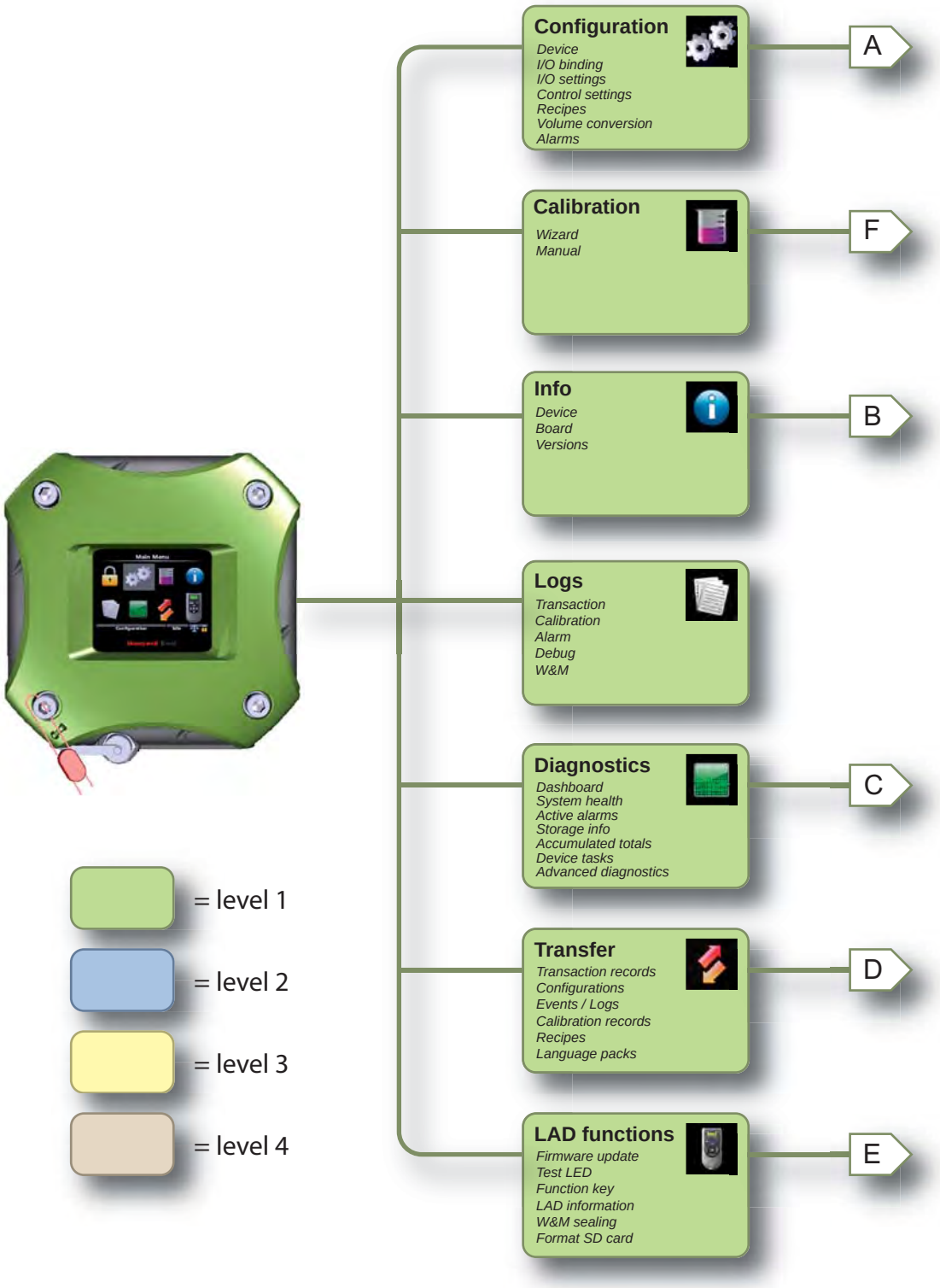
In section *5.11 - Configuration*, each setup item is described followed by a hands-on part that informs how to commission the relevant parameter setting(s) through the menu-based interface.

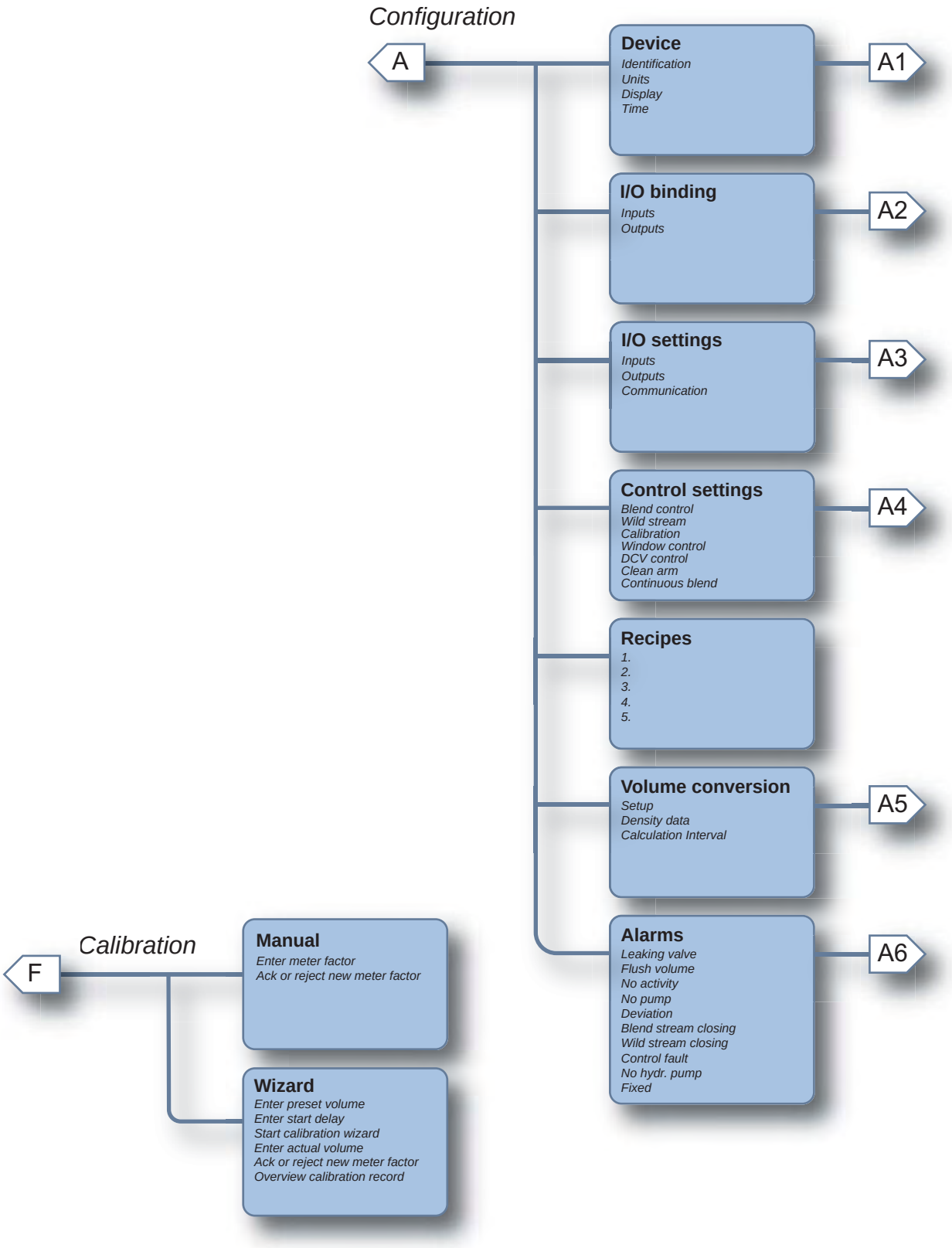
By using the Fusion4 IR Controller or the LAD, and starting from the Main menu, the various sub-menus can be selected.

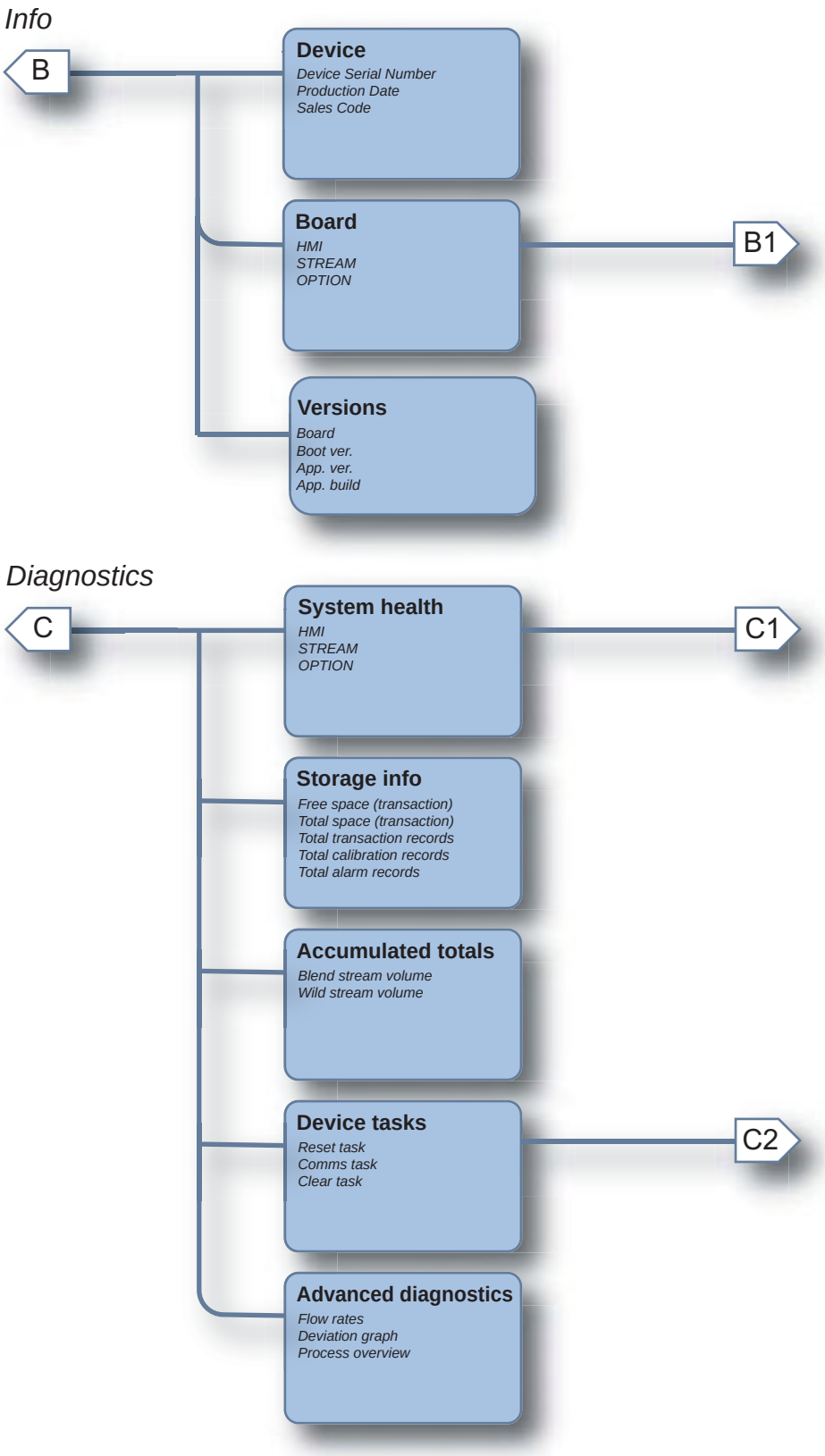
In this way all entities can be reached and set.

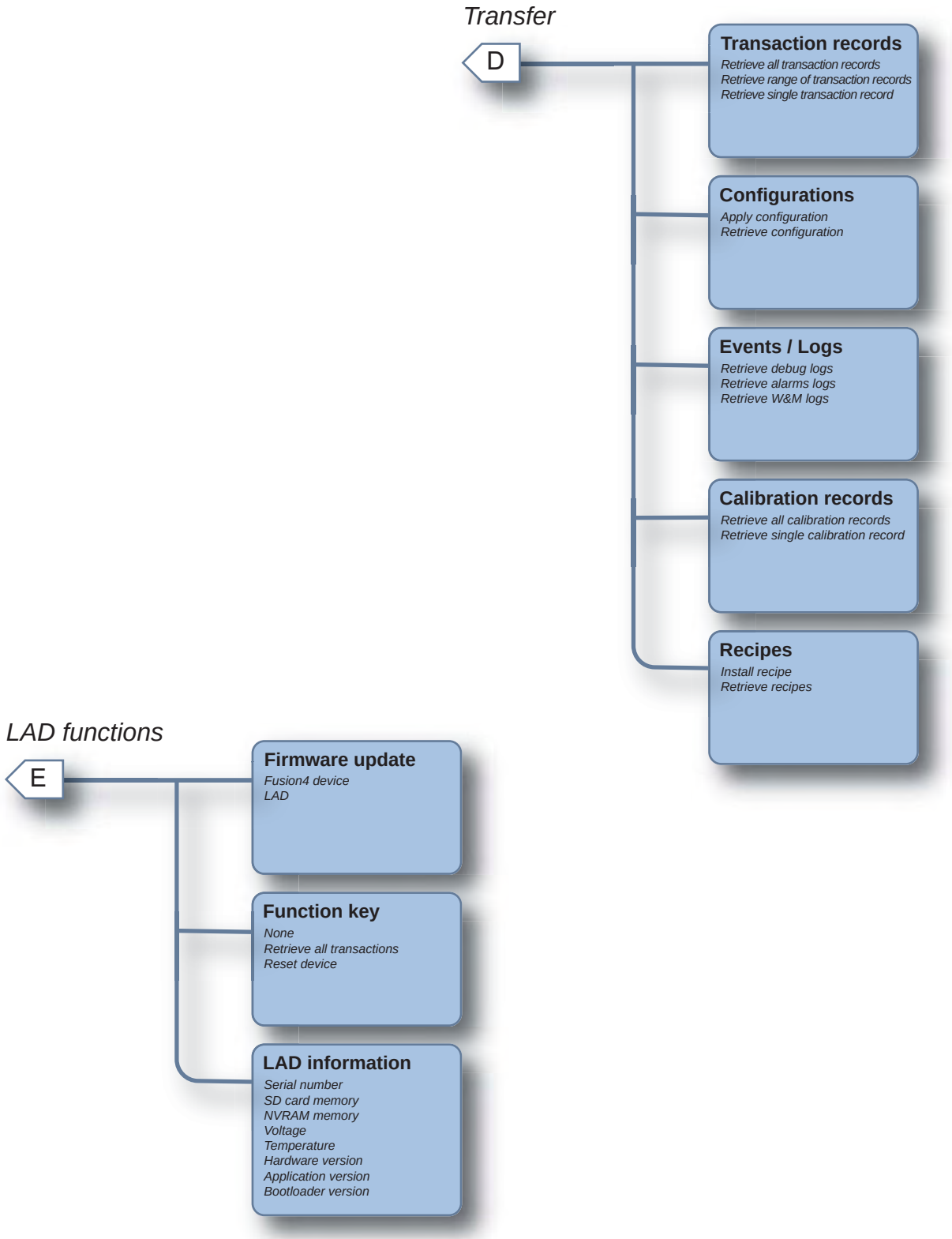
5.9.2 Menu Structure

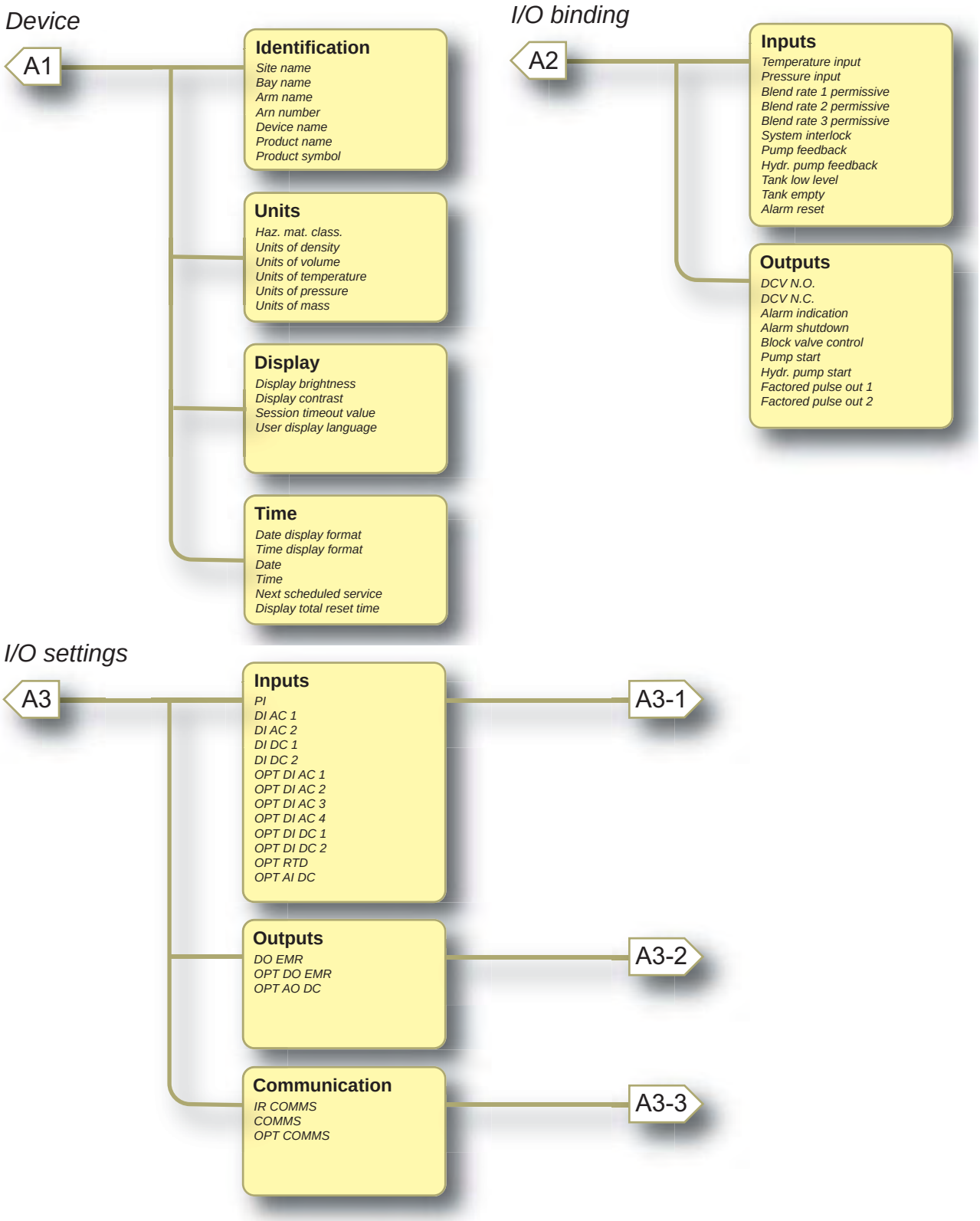
For an overview of the menu structure with all entities and parameters, see the following diagrams.

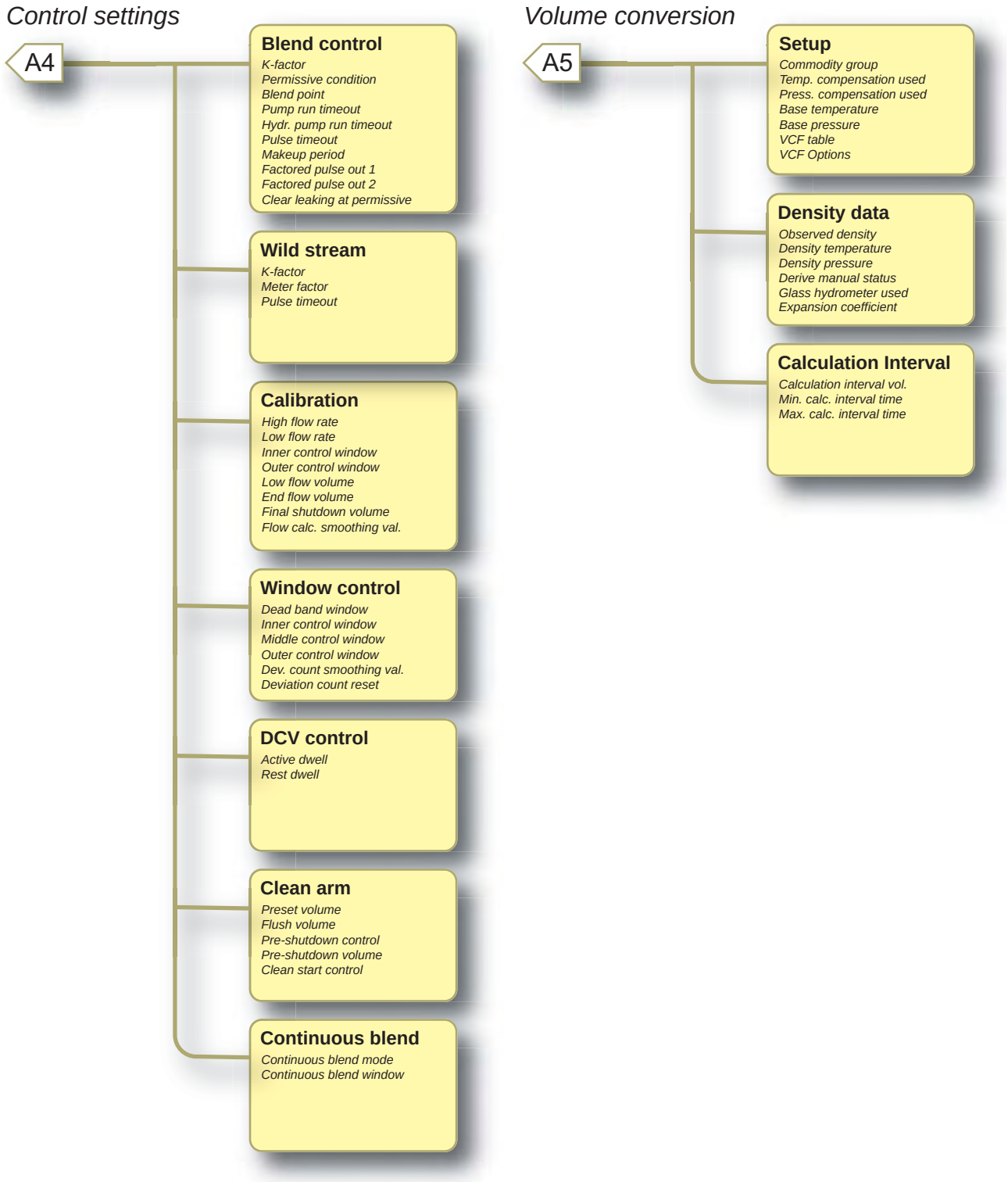

Configuration
Device
I/O binding
I/O settings
Control settings
Recipes
Volume conversion
Alarms
A
Calibration
Wizard
Manual
F
Info
Device
Board
Versions
B
Logs
Transaction
Calibration
Alarm
Debug
W&M
Diagnostics
Dashboard
System health
Active alarms
Storage info
Accumulated totals
Device tasks
Advanced diagnostics
C
Transfer
Transaction records
Configurations
Events / Logs
Calibration records
Recipes
Language packs
D
LAD functions
Firmware update
Test LED
Function key
LAD information
W&M sealing
Format SD card
E
= level 1
= level 2
= level 3
= level 4

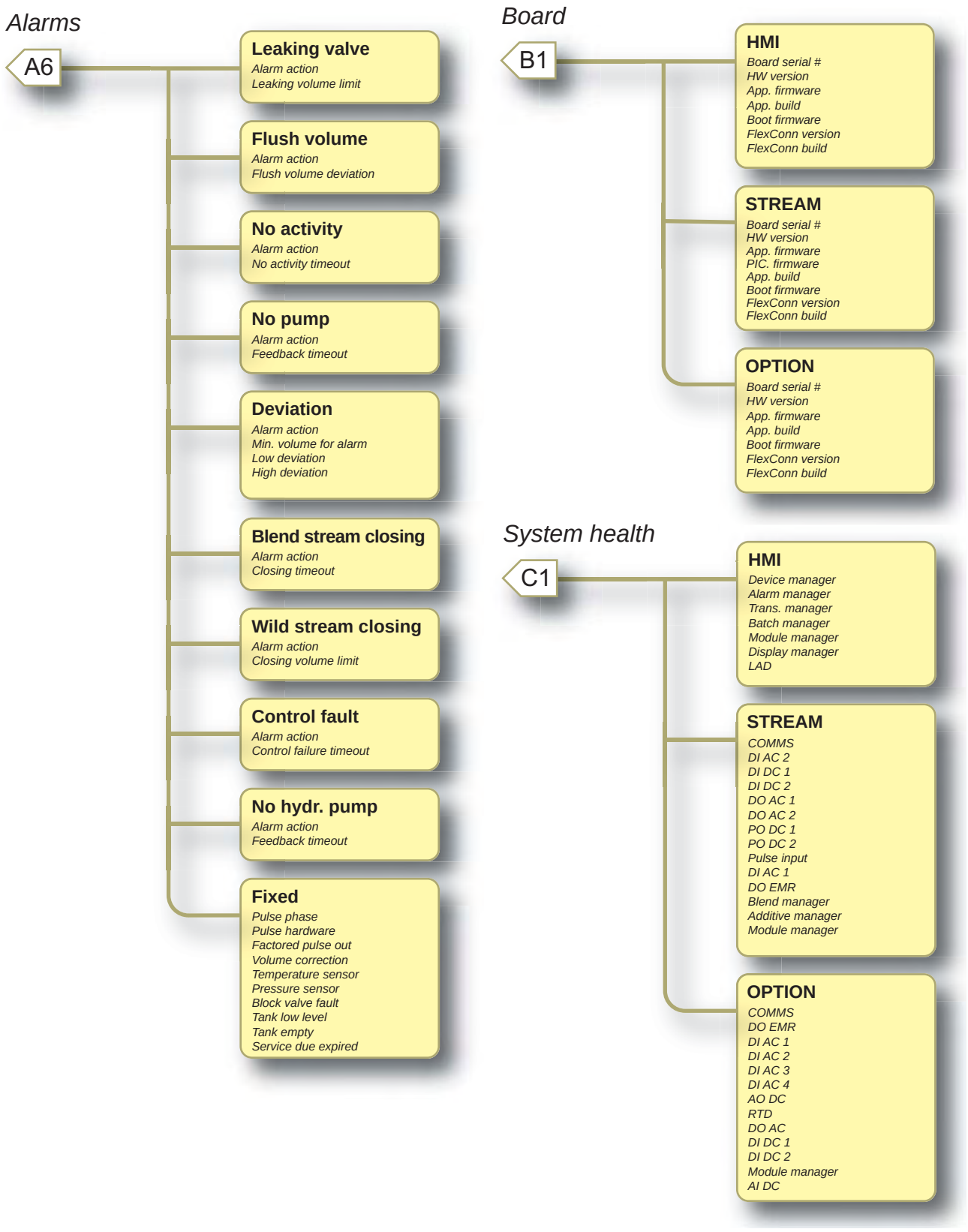

Configuration
A
Device
Identification
Units
Display
Time
A1
I/O binding
Inputs
Outputs
A2
I/O settings
Inputs
Outputs
Communication
A3
Control settings
Blend control
Wild stream
Calibration
Window control
DCV control
Clean arm
Continuous blend
A4
Recipes
1.
2.
3.
4.
5.
Volume conversion
Setup
Density data
Calculation Interval
A5
Alarms
Leaking valve
Flush volume
No activity
No pump
Deviation
Blend stream closing
Wild stream closing
Control fault
No hydr. pump
Fixed
A6
Calibration
F
Manual
Enter meter factor
Ack or reject new meter factor
Wizard
Enter preset volume
Enter start delay
Start calibration wizard
Enter actual volume
Ack or reject new meter factor
Overview calibration record

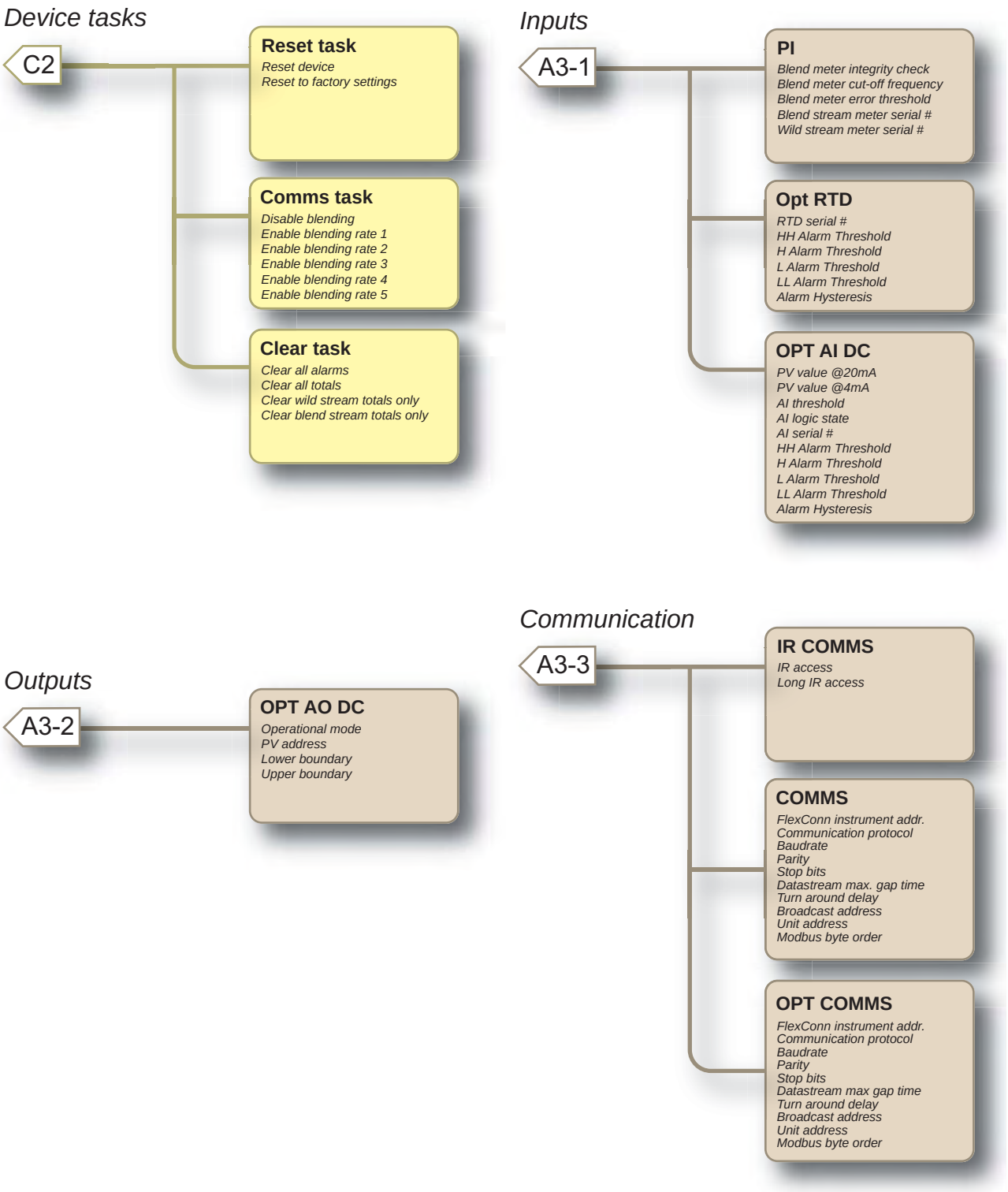

Info
B
Device
Device Serial Number
Production Date
Sales Code
Board
HMI
STREAM
OPTION
B1
Versions
Board
Boot ver.
App. ver.
App. build
Diagnostics
C
System health
HMI
STREAM
OPTION
C1
Storage info
Free space (transaction)
Total space (transaction)
Total transaction records
Total calibration records
Total alarm records
Accumulated totals
Blend stream volume
Wild stream volume
Device tasks
Reset task
Comms task
Clear task
C2
Advanced diagnostics
Flow rates
Deviation graph
Process overview


Transfer
D
Transaction records
Retrieve all transaction records
Retrieve range of transaction records
Retrieve single transaction record
Configurations
Apply configuration
Retrieve configuration
Events / Logs
Retrieve debug logs
Retrieve alarms logs
Retrieve W&M logs
Calibration records
Retrieve all calibration records
Retrieve single calibration record
Recipes
Install recipe
Retrieve recipes
LAD functions
E
Firmware update
Fusion4 device
LAD
Function key
None
Retrieve all transactions
Reset device
LAD information
Serial number
SD card memory
NVRAM memory
Voltage
Temperature
Hardware version
Application version
Bootloader version

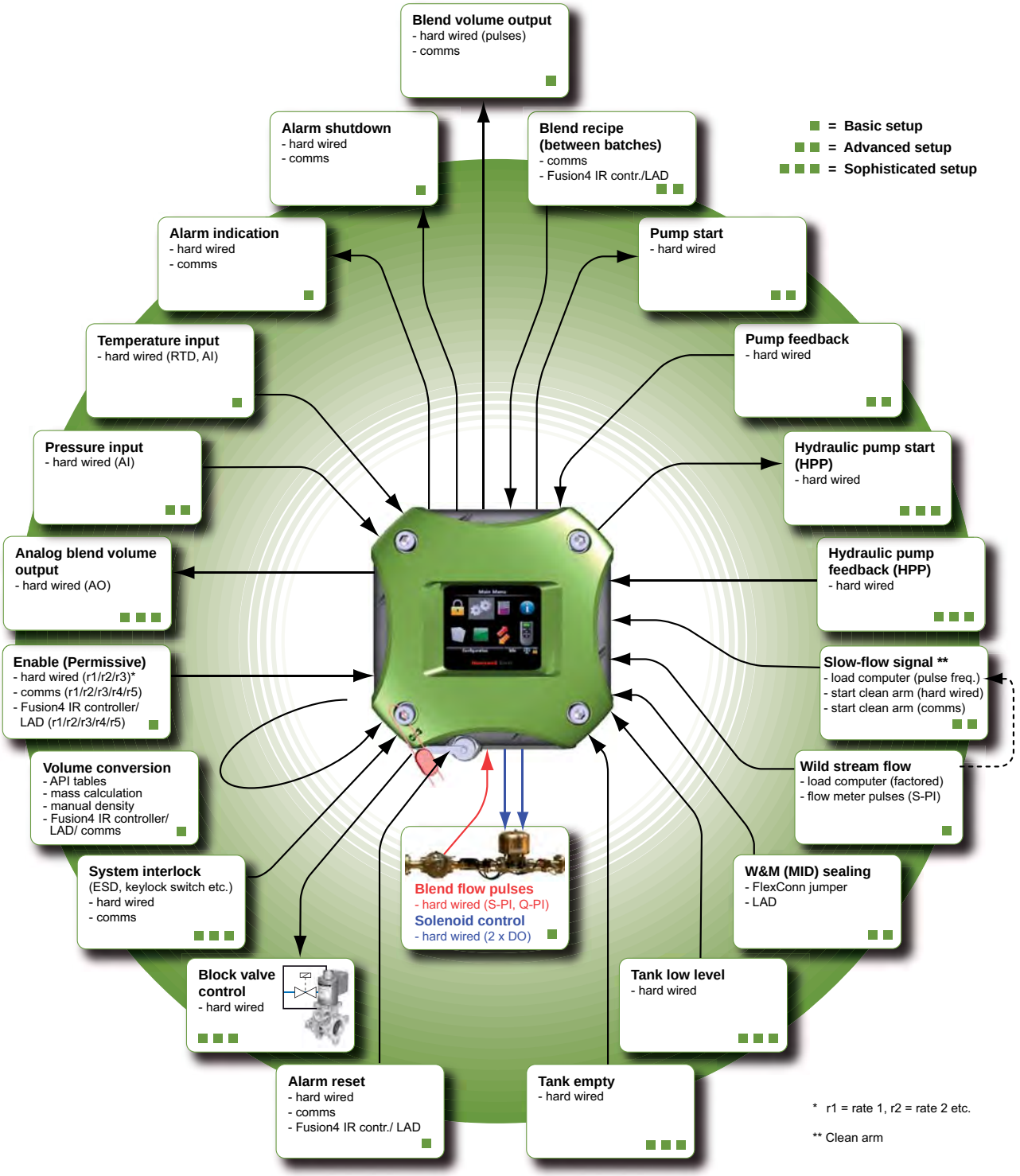

Device
A1
Identification
Site name
Bay name
Arm name
Arn number
Device name
Product name
Product symbol
Units
Haz. mat. class.
Units of density
Units of volume
Units of temperature
Units of pressure
Units of mass
Display
Display brightness
Display contrast
Session timeout value
User display language
Time
Date display format
Time display format
Date
Time
Next scheduled service
Display total reset time
I/O binding
A2
Inputs
Temperature input
Pressure input
Blend rate 1 permissive
Blend rate 2 permissive
Blend rate 3 permissive
System interlock
Pump feedback
Hydr. pump feedback
Tank low level
Tank empty
Alarm reset
Outputs
DCV N.O.
DCV N.C.
Alarm indication
Alarm shutdown
Block valve control
Pump start
Hydr. pump start
Factored pulse out 1
Factored pulse out 2
I/O settings
A3
Inputs
PI
DI AC 1
DI AC 2
DI DC 1
DI DC 2
OPT DI AC 1
OPT DI AC 2
OPT DI AC 3
OPT DI AC 4
OPT DI DC 1
OPT DI DC 2
OPT RTD
OPT AI DC
A3-1
Outputs
DO EMR
OPT DO EMR
OPT AO DC
A3-2
Communication
IR COMMS
COMMS
OPT COMMS
A3-3


Control settings
A4
Blend control
K-factor
Permissive condition
Blend point
Pump run timeout
Hydr. pump run timeout
Pulse timeout
Makeup period
Factored pulse out 1
Factored pulse out 2
Clear leaking at permissive
Wild stream
K-factor
Meter factor
Pulse timeout
Calibration
High flow rate
Low flow rate
Inner control window
Outer control window
Low flow volume
End flow volume
Final shutdown volume
Flow calc. smoothing val.
Window control
Dead band window
Inner control window
Middle control window
Outer control window
Dev. count smoothing val.
Deviation count reset
DCV control
Active dwell
Rest dwell
Clean arm
Preset volume
Flush volume
Pre-shutdown control
Pre-shutdown volume
Clean start control
Continuous blend
Continuous blend mode
Continuous blend window
Volume conversion
A5
Setup
Commodity group
Temp. compensation used
Press. compensation used
Base temperature
Base pressure
VCF table
VCF Options
Density data
Observed density
Density temperature
Density pressure
Derive manual status
Glass hydrometer used
Expansion coefficient
Calculation Interval
Calculation interval vol.
Min. calc. interval time
Max. calc. interval time


Alarms
A6
Leaking valve
Alarm action
Leaking volume limit
Flush volume
Alarm action
Flush volume deviation
No activity
Alarm action
No activity timeout
No pump
Alarm action
Feedback timeout
Deviation
Alarm action
Min. volume for alarm
Low deviation
High deviation
Blend stream closing
Alarm action
Closing timeout
Wild stream closing
Alarm action
Closing volume limit
Control fault
Alarm action
Control failure timeout
No hydr. pump
Alarm action
Feedback timeout
Fixed
Pulse phase
Pulse hardware
Factored pulse out
Volume correction
Temperature sensor
Pressure sensor
Block valve fault
Tank low level
Tank empty
Service due expired
Board
B1
HMI
Board serial #
HW version
App. firmware
App. build
Boot firmware
FlexConn version
FlexConn build
STREAM
Board serial #
HW version
App. firmware
PIC. firmware
App. build
Boot firmware
FlexConn version
FlexConn build
OPTION
Board serial #
HW version
App. firmware
App. build
Boot firmware
FlexConn version
FlexConn build
System health
C1
HMI
Device manager
Alarm manager
Trans. manager
Batch manager
Module manager
Display manager
LAD
STREAM
COMMS
DI AC 2
DI DC 1
DI DC 2
DO AC 1
DO AC 2
PO DC 1
PO DC 2
Pulse input
DI AC 1
DO EMR
Blend manager
Additive manager
Module manager
OPTION
COMMS
DO EMR
DI AC 1
DI AC 2
DI AC 3
DI AC 4
AO DC
RTD
DO AC
DI DC 1
DI DC 2
Module manager
AI DC


Device tasks
C2
Reset task
Reset device
Reset to factory settings
Comms task
Disable blending
Enable blending rate 1
Enable blending rate 2
Enable blending rate 3
Enable blending rate 4
Enable blending rate 5
Clear task
Clear all alarms
Clear all totals
Clear wild stream totals only
Clear blend stream totals only
Inputs
A3-1
PI
Blend meter integrity check
Blend meter cut-off frequency
Blend meter error threshold
Blend stream meter serial #
Wild stream meter serial #
Opt RTD
RTD serial #
HH Alarm Threshold
H Alarm Threshold
L Alarm Threshold
LL Alarm Threshold
Alarm Hysteresis
OPT AI DC
PV value @20mA
PV value @4mA
AI threshold
AI logic state
AI serial #
HH Alarm Threshold
H Alarm Threshold
L Alarm Threshold
LL Alarm Threshold
Alarm Hysteresis
Outputs
A3-2
OPT AO DC
Operational mode
PV address
Lower boundary
Upper boundary
Communication
A3-3
IR COMMS
IR access
Long IR access
COMMS
FlexConn instrument addr.
Communication protocol
Baudrate
Parity
Stop bits
Datastream max. gap time
Turn around delay
Broadcast address
Unit address
Modbus byte order
OPT COMMS
FlexConn instrument addr.
Communication protocol
Baudrate
Parity
Stop bits
Datastream max gap time
Turn around delay
Broadcast address
Unit address
Modbus byte order

5.10 Blending Application Overview



5.11 Configuration

5.11.1 Using the Configuration Menu

- Through the Configuration menu, you can access the device configuration parameters, except the blend meter calibration entities.
- The structured menu system with device configuration are grouped in a logical order.
- The current device configuration values are always shown.
- In the type-specific data entry window, all configuration values are edited one at a time.

5.11.2 Device

For the SSC-B itself several parameters such as site identification, used units, display settings, and so on can be set.

5.11.2.1 Identification

Entity	Description	Value range
[Site name]	With this entity you can enter the name of the site at which the SSC is located.	Can be a text string of maximum 20 characters.
[Bay name]	With this entity you can enter the name of the loading bay at which the SSC is located at the site. The Bay name is shown in the running screens.	Can be a text string of maximum 20 characters. Use maximum 7 characters in order to see the complete name on the SSC screen.
[Arm name]	With this entity you can enter the name of the loading arm at which the SSC is located at the site. The Arm name is shown in the running screens.	Can be a text string of maximum 20 characters. Use maximum 7 characters in order to see the complete name on the SSC screen.
[Arm Number]	The number of the loading arm at which the SSC is located at site.	A value which is less than 32.
[Device name]	With this entity you can enter the name of the SSC itself, in order to have a unique identification of the device by a text string.	Can be a text string of maximum 20 characters. By default, the device name is SSC_BLND.
[Product name]	With this entity you can enter the name of the wild stream product. The Product name is shown in the running screens.	A text string of max. 20 characters. Use maximum 12 characters in order to see the complete name on the SSC screen.
[Product symbol]	With this entity you can enter a symbol or icon which can be associated to identify the product of the wild stream. This icon is shown in the running screens.	For the U.S.-related market, you can select from a list of API symbols. For the EU-related market, you can select from a list of EI symbols.

5.11.2.1.1 Recipe Identification

In general, the recipe can be associated with a name [Product name]. To the configured blend recipe, a *symbol or icon* can be associated to identify the wild stream <Wild stream identification>. Both entities [Product name] and <Wild stream identification> are shown in the running screen.

- For the **USA-related market**, you can select from a list of *API symbols* as defined in: *API Recommended Practice 1637, Third edition, July 2006*.

The following product symbols are available:

Description	Menu text displayed	Symbol
High-grade unleaded gasoline	HGU gasoline	
Mid-grade unleaded gasoline	MGU gasoline	

Description	Menu text displayed	Symbol
Low grade unleaded gasoline	LGU gasoline	
Ultra low sulfer diesel	ULS diesel	
Low sulfer diesel	LS diesel	
High sulfer diesel	HS diesel	
Low sulfer no. 1 fuel oil	LS no. 1 fuel oil	
High sulfer no. 1 fuel oil	HS no. 1 fuel oil	
Low sulfer no. 2 fuel oil	LS no. 2 fuel oil	
High sulfer no. 2 fuel oil	HS no. 2 fuel oil	
Ultra low sulfer kerosene	ULS kerosene	
Low sulfer kerosene	LS kerosene	
High sulfer kerosene	HS kerosene	
E5 (5% Alcohol based fuel)	API E5	
E10 (10% Alcohol based fuel)	API E10	
E20 (20% Alcohol based fuel)	API E20	
B5 (5% Bio blended diesel)	API B5	
B10 (10% Bio blended diesel)	API B10	

Description	Menu text displayed	Symbol
B20 (20% Bio blended diesel)	API B20	
Used oil		
Observation or monitoring well	Monitoring well	
Vapor recovery		

- For the **EU-related market**, you can select from a list of symbols as defined in: *Code of practice for a product identification system for petroleum products (Energy Institute)*.

The following product symbols are available:

Description	Menu text displayed	Symbol
Lead Replacement Petrol	Lead repl. petrol	
Premium unleaded Petrol (95 octane)	PU petrol	
Super unleaded petrol (97 octane)	SU petrol	
E5 (5% ethanol, 95% petrol)	EU E5	
E10 (10% ethanol, 90% petrol)	EU E10	
E20 (20% ethanol, 80% petrol)	EU E20	
DERV		
B5 (5% FAME, 95% diesel)	EU B5	
B10 (10% FAME, 90% diesel)	EU B10	

Description	Menu text displayed	Symbol
B20 (20% FAME, 80% diesel)	EU B20	
Gas oil (marked heating oil)		
Marine Gas Oil		
Ultra low sulfur gas oil (marked) (with less than 10 ppm sulfur)	ULS gas oil	
Premium kerosine		
Regular kerosine		
Fuel oil: light, medium, heavy For example, HFO for heavy fuel oil		
Bitumen: penetration, cutback, oxidised For example,100 PEN for 100 penetration		
FAME		
Fuel grade ethanol		

5.11.2.2 Units

Entity	Description	Value range
[Haz. mat. class]	With this entity, you can specify the hazardous material classification. This entity can describe the following: • name of the product • character of the product (flammable, explosive, and so on) • potential harm to people or the environment • physical condition of the product (liquified, hot, compressed, and so on)	A common way to describe the dangerous or hazardous material is defined in the ADR-code defined by the "European Agreement concerning the International Carriage of Dangerous Goods by Road". The ADR code consist of a class and a four-digit UN-number. Example: <ALLYL ALCOHOL, 6.1, UN 1098> Product: Allyl alcohol Class = 6.1: Toxic substances UN number: 1098
[Units of density]	With this entity you can select the engineering units for density.	<kg/m^3> (default) <°API> <lb/ft^3> <RD @60°F>
[Units of volume]	With this entity you can select the engineering units for volume.	<L> (default) <m^3> <cm^3> <dm^3> <US Gal> <UK Gal> <bbls>
[Units of temperature]	With this entity you can select the engineering units for temperature.	<^{0}C> (default) <^{0}F>
[Units of pressure]	With this entity you can select the engineering units for pressure.	<Pa> (default) <KPa> <PSI> <bar>
[Units of mass]	With this entity you can select the engineering units for mass.	<kg (default) <ton> <lbs> <ton (UK)> <ton (US)>

Description	Name	Unit	Range min	Range max	Format
Transaction volume	Litre	L	0	999999.99	6 [ds] 2
	Cubic meter	m^3	0	999.99999	3 [ds] 5
	Cubic centimeter	cm^3	0	999999990	9
	Cubic decimeter	dm^3	0	999999.99	6 [ds] 2
	US gallons	US gal	0	99999.999	5 [ds] 3
	UK gallons	UK gal	0	99999.999	5 [ds] 3
	Barrel	bbls	0	9999.9999	4 [ds] 4

Description	Name	Unit	Range min	Range max	Format
Accumulated total volume	Litre Cubic meter Cubic centimeter Cubic decimeter US gallons UK gallons Barrel	L m^3 cm^3 dm^3 US gal UK gal bbls	0 0 0 0 0 0 0	99999999 99999.999 99999999000 99999999 9999999.9 9999999.9 999999.99	8 5[ds]3 11 8 7[ds]1 7[ds]1 6[ds]2
Transaction additive volume	Millilitre Cubic centimeter	ml cc	0 0	999999.99 999999.99	6[ds]2 6[ds]2
Accumulated total additive volume	Liter Cubic meter Cubic centimeter Cubic decimeter US Gallons UK Gallons Barrel	L m^3 cm^3 dm^3 US gal UK gal bbl	0 0 0 0 0 0 0	99999.999 99.999999 99999999 99999.999 99999.999 99999.999 999.99999	5[ds]3 2[ds]6 8 5[ds]3 5[ds]3 5[ds]3 3[ds]5
Mass	Kilogram Metric ton Pound Long ton (UK) Short ton (US)	kg ton lb long ton US ton	0 0 0 0 0	999999.99 999.99999 999999.99 999.99999 999.99999	6[ds]2 3[ds]5 6[ds]2 3[ds]5 3[ds]5
Temperature	Celsius Fahrenheit	°C °F	-300.00 -400.0	300.00 572.0	3[ds]2 3[ds]1
Density	Kilogram cubic meter Degrees API Pounds cubic feet Relative density @ 60°F	kg/m3 °API lb/ft3 RD60	0 -50.0 0 0	9999.9 600.0 999.99 9.9999	4[ds]1 3[ds]1 3[ds]2 1[ds]4
Pressure	Bar Pascal Kilo Pascal PSI RANGE 100 PSI RANGE 1000	bar Pa kPa psi_r100 psi_r1000	0 0 0 0 0	999.99 99999000 99999 999.9999 999.999	3[ds]2 8 5[ds]0 3[ds]4 3[ds]3
Ratio	Percentage Parts per million	% ppm	0.00 0	99.99 999999	2 [ds] 2 6
Expansion coefficient	Inverse Fahrenheit Inverse Celsius	10-7/°F 10-7/°C	00000 00000	99999 99999	5 5
Flow rate	Liter per minute Cubic meter per minute Cubic centimeter per minute Cubic decimeter per minute US Gallons per minute UK Gallons per minute Barrel per minute	L/min m3/min cm3/min dm3/min US gal/min UK gal/min bbl/min	0 0 0 0 0 0 0	999999.99 999.99999 999999990 999999.99 99999.999 99999.999 9999.9999	6 [ds] 2 3 [ds] 5 9 6[ds]2 5[ds]3 5[ds]3 4[ds]4
Additive Flow rate	Milliliter per minute Cubic centimeter per minute	ml/min cc/min	0 0	999999.99 999999.99	6[ds]2 6[ds]2

5.11.2.3 Display

Entity	Description	Value range
[Display brightness]	With this entity you can enter the brightness of the display. The brightness is controlled by the backlight of the display.	<0> % (low) ... <100> % (high) (default = <75> %)
[Display contrast]	With this entity you can enter the contrast of the display.	<0> % (low) ... <100> % (high) (default = <75> %)
[Session timeout value]	With this entity you can enter the time in seconds between last keypress on Fusion4 IR controller and the moment the display switches back to one of the running screens.	<10> s.. <600> s (default = <300> s
[User display language]	With this entity you can select the display language for the running screens.	<English UK> <English US> (default) <French> <German> <Dutch> <Spanish> <Chinese> <Japanese> <Polish> <Portuguese> <Italian> <Local language>

5.11.2.4 Time

Entity	Description	Value range
[Date display format]	This entity selects the format of the date.	<DD_MM_YY> (default) <MM_DD_YY> <YY_MM_DD> <DD_MM_YYYY> <MM_DD_YYYY> *Note: Only the first 3 selections is completely visible on the SSC screen.*
[Time display format]	This entity selects the format of the time.	<12-hour> <24-hour> (default) *Note: Only the 24-hours selection is completely visible on the SSC screen.*
[Date]	This entity selects the actual date and is used for time stamping of transactions, calibrations, and alarms.	Year Month Day *Note: By default, the current date appears. However, to change the default date, enter the year, month, and day.*
[Time]	This entity selects the actual time and is used for time stamping of transactions, calibrations, and alarms.	Hour Minute Second Millisecond *Note: By default, the current time appears. However, to change the default time, enter the hour, minute, second, and millisecond.*
[Next scheduled service]	This entity selects the date when the next service activities should take place for the SSC-B. It is handled like an alarm so it can be configured to desired alarm behaviour (Disable, Display or Shutdown).	Year Month Day *Note: By default, 01-01-10 appears. However, to change the default date enter the year, month, and day.*
[Daily total reset time]	With this entity you can select the time at which the daily totals is cleared.	Hour Minute Second Millisecond *Note: By default, 00:00:00 appears. However to change the daily totals reset time, enter the hour, minute, second, and millisecond.*

5.11.3 I/O binding

The flexible I/O allocation architecture forms the basis of the Fusion4 product family. It is designed around common I/O building blocks that can be arranged in different configurations to be used in the Fusion4 Single Stream Controller (SSC).

I/O allocation can either be done through a Fusion4 IR Controller through the infrared link or a LAD connected to front connector of the SSC-B (see FIGURE 5-9).

FIGURE 5-9 I/O allocation using a Fusion4 IR controller or a LAD

F4A10-0028

➔ Select Configuration in the Main Menu (see screen right)

➔ Select [I/O binding] + <OK>

➔ Select [Inputs] or [Outputs] + <OK>

Now you can select a specific entity, for example, [Blend rate 1 permissive], [Pump feedback], and so on, and link it to a specific I/O function, for example, to <DI AC 1> (Digital Input AC[1], number 1), <DO EMR> (Digital Output Electromechanical Relay), and so on.

The possible entities and the I/O functions to which a specific entity can be linked is given in following table.

1. For I/O functions description, see 3.9 ... 3.11.1.3.

5.11.3.1 Possible I/O bindings Survey

Inputs/ Outputs	Entity	Link is possible to ...
Inputs NOTE: The default value for the Input entities are None.	[Temperature input]	None, OPT RTD, OPT AI DC
	[Pressure input]	None, OPT AI DC
	[Blend rate 1 permissive]	None, Comms., DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2, OPT AI DC
	[Blend rate 2 permissive]	None, Comms., DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2, OPT AI DC
	[Blend rate 3 permissive]	None, Comms., DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2, OPT AI DC
	[System interlock]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2
	[Pump feedback]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2
	[Hydr. pump feedback]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2
	[Tank low level]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT AI DC, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2
	[Tank empty]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT AI DC, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2
	[Alarm reset]	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

Inputs/ Outputs	Entity	Link is possible to ...
Outputs NOTE: The default value for the Output entities are None.	[DCV N.O.]	None, DO AC 1, DO AC 2, OPT DO AC1
	[DCV N.C.]	None, DO AC 1, DO AC 2, OPT DO AC1
	[Alarm indication]	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC
	[Alarm shutdown]	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC
	[Block valve control]	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC
	[Pump start]	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC
	[Hydr. pump start]	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC
	[Factored pulse out 1]	None, PO DC 1, PO DC 2
	[Factored pulse out 2]	None, PO DC 1, PO DC 2

5.11.3.2 Inputs

5.11.3.2.1 Temperature Input

The SSC-B temperature input is available for volume conversion of the measured gross observed volume, to facilitate high-accuracy custody transfer of the blend stream product.

For temperature measurement, one of the following inputs of the option board can be used:

- AI
- RTD (Mandatory for MID (W&M))

The RTD (Resistance Temperature Detector) temperature converter is more accurate (± 0.3 ºC/ ± 0.5 ºF) than the AI (Analog Input) circuitry, and to meet the MID requirements this input must be used for temperature measurement.

The external connected RTD should be a PT100 industrial platinum resistance thermometer sensor that is compliant with IEC 60751 (edition 1995).

The IEC 60751 defines:

- How to be made (platinum with an α = 0.00385 Ω/Ω/˚C [0.00214 Ω/Ω/˚F)
- How to calculate temperature from resistance
- Accuracy classes

For MID compliance, it is required to use an RTD sensor with an accuracy equal or better: ± 0.4 ºC [± 0.7 ºF].

It is highly recommended to use a Class A or Class 1/10 DIN PT100:

- Class A is 100Ω +/- 0.06Ω at 0˚C [32˚F]
- Class B is 100Ω +/- 0.12Ω at 0˚C [32˚F]

Not explicitly defined in IEC 60751 but compatible:

- Class 1/3 DIN is 100Ω +/- 0.04Ω at 0˚C [32˚F] (0.12Ω / 3 = 0.04Ω)
- Class 1/5 DIN is 100Ω +/- 0.024Ω at 0˚C [32˚F] (0.12Ω / 5 = 0.024Ω)
- Class 1/10 DIN is100Ω +/- 0.012Ω at 0˚C [32˚F] (0.12Ω / 10 = 0.012Ω)

Entity	Description	Value range
[Temperature input]	This entity selects the physical source for the blend stream temperature measurement.	None, OPT RTD, OPT AI DC

5.11.3.2.2 Pressure Input

The SSC-B pressure input is available for volume conversion of the measured gross observed volume to be able to facilitate high-accuracy custody transfer of the blend stream product. For pressure measurement the Analog Input circuitry of the option board must be used.

The accuracy of this pressure converter is:

- ± 30 kPa [4.35 psi] (P < 1 MPa [145 psi])
- ± 3 % (1 ≤ P ≥ 2 MPa [290 psi])

It is highly recommended to use a 4-20 mA pressure sensor with accuracy equal or better:

- ± 40 kPa [5.80 psi] (P < 1 MPa [145 psi])
- ± 4 % (1 ≤ P ≥ 2 MPa [290 psi])

Entity	Description	Value range
[Pressure input]	This entity selects the physical source for the permissive function.	None, OPT AI DC

5.11.3.2.3 Blend Rate # Permissive

All transactions begin when the stream permissive conditions become true and end when the stream permissive becomes false.

The permissive I/O binding defines three general means of permissive configuration for the device. The value of the permissive I/O binding can be one of the following values:

- Comms
  - Transaction start condition - When a serial command is received to enable the device
    - Enable rate 1

- Enable rate 2
- Enable rate 3
- Enable rate 4
- Enable rate 5

• Transaction end condition - When a serial command is received to disable the device

■ Digital Input

• Transaction start condition - When the digital input is active.

- Enable rate 1
- Enable rate 2
- Enable rate 3

• Transaction end condition – When the digital input is inactive.

Entity	Description	Value range
[Blend rate 1 permissive]	This entity selects the physical source for blend rate 1 permissive function.	None, Comms., DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2, OPT AI DC
[Blend rate 2 permissive]	This entity selects the physical source for blend rate 2 permissive function.	
[Blend rate 3 permissive]	This entity selects the physical source for blend rate 3 permissive function.	

5.11.3.2.4 System Interlock

■ An optional secondary permissive can be defined with an I/O binding for typical use of for example, ESD (emergency shut down, keylock switch, or deadman input).

■ When a secondary permissive is defined, then it is combined with the normal (primary) permissive through a logical AND or OR function (Configuration > Control Settings > Blend Control).

• If the permissive condition is OR, then the device is enabled when either (or both) the primary or secondary permissives are true.

• If the permissive condition is AND, then the device is enabled when both the primary and secondary permissives are true.

■ If the secondary I/O binding is not defined, then secondary permissive is not used, and the permissive condition is not applicable.

Entity	Description	Value range
[System interlock]	This entity selects the physical source for the alarm reset function.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.2.5 Pump Feedback

This input is a feedback from the blend pump, to be able to check if the pump is running.

- If the blend [Pump feedback] I/O binding is defined, then the controller
  - should generate an error in the [pump feedback timeout] if the pump indication input is inactive;
  - after the pump demand is active.
- The allowable delay is defined by the [Pump feedback timeout] entity (defined in the alarm settings submenu for this alarm).

Entity	Description	Value range
[Pump feedback]	This entity selects the physical source for the slow flow signal.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.2.6 Hydraulic Pump Feedback (HPP)

This feedback signal is used to control the Honeywell Enraf HPP (Hydraulic Power Pack) system.

The Hydraulic Power Pack system is used to pressurize the product in the piping going to the control valve.

The *hydraulic* pump feedback works identical as the pump feedback function, using the [Hydr. pump feedback] I/O binding.

Entity	Description	Value range
[Hydr. pump feedback]	This entity selects the physical source for the pump feedback function.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.2.7 Tank Low Level

Supply-tank level monitoring is useful in applications where a very small supply tank is used. This is typical in portable or mobile applications such as truck-mounted systems.

By monitoring a hardware input connected to a level switch in the supply tank, the controller can detect when the level in the tank is nearing empty, and take appropriate action. This prevents the pump from running completely dry, and prevents fueling operations from being interrupted mid-load.

The tank-level signals used should provide a simple form contact closure upon detection of a low level (in excess of some low point) in the supply tank. Consideration should be given to the pump intake position in the tank and to the amount of blend volume required for a normal fuel delivery.

The switch-activation level should be positioned so that it is slightly higher than the level required for normal delivery. Thus, if the tank low-level switch indicates “low” immediately upon start of the delivery, there is still an adequate volume in the tank to allow the delivery to complete prior to the pump inlet drawing air.

If the *low-level condition* exists, the SSC-B *can still operate* under normal condition. To clear the tank low-level signal, the tank must be refilled to a point that closes the level switch. At that time, the alarm disappears. There is no need to reset the condition as with normal alarms.

Entity	Description	Value range
[Tank low level]	This entity selects the physical source for the tank low level function.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT AI DC, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.2.8 Tank Empty

If the *tank-empty condition* exists, the SSC-B *cannot operat*e under normal condition. To clear the tank-empty signal, the tank must be refilled to a point that closes the level switch. At that time, the alarm disappears and the SSC-B can then resume normal use. There is no need to reset the condition as with normal alarms.

Entity	Description	Value range
[Tank empty]	This entity selects the physical source for the tank empty function.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT AI DC, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.2.9 Alarm Reset

Any active alarms can be reset through any one of three ways:

- Through hard-wired digital input, defined by I/O binding
- Through a serial comms command
- With the Fusion4 IR controller/LAD through the alarm summary screen

Entity	Description	Value range
[Alarm reset]	This entity selects the physical source for the alarm reset function.	None, DI AC 1, DI AC 2, DI DC 1, DI DC 2, OPT DI AC 1, OPT DI AC 2, OPT DI AC 3, OPT DI AC 4, OPT DI DC 1, OPT DI DC 2

5.11.3.3 Outputs

5.11.3.3.1 Digital Control Valve Normally Open (DCV N.O.)

A digital control valve (DCV) is an electrically-controlled, hydraulically-operated multi-function control valve. Because of its precision multi-stage opening and closing and its fail-safe design, it is used to control the blend flow.

Entity	Description	Value range
[DCV N.O.]	This entity selects the physical source for the Normally Open solenoid of the Digital Control Valve that controls the blend stream.	None, DO AC 1, DO AC 2, OPT DO AC1

5.11.3.3.2 Digital Control Valve Normally Closed (DCV N.C.)

Description: see 5.11.3.3.1.

Entity	Description	Value range
[DCV N.C.]	This entity selects the physical source for the Normally Closed solenoid of the Digital Control Valve that controls the blend stream.	None, DO AC 1, DO AC 2, OPT DO AC1

5.11.3.3.3 Alarm Indication

This output is used to signal alarms to other instruments or systems in the environment of the SSC-B.

When the [Alarm indication] becomes active, the SSC-B still operates under required conditions for example, finalize the running batch.

If [Alarm action] is set to <Display>, the following actions occur:

- The alarm-indication output is set to ON.
- Alarm is shown on the display.

Entity	Description	Value range
[Alarm indication]	This entity selects the physical source for the alarm indication function. The alarm indication is driven as long as there is at least one non-acknowledged alarm.	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC

5.11.3.3.4 Alarm Shutdown

This output is used to signal fatal alarms to other instruments or systems in the environment of the SSC-B.

When the [Alarm shutdown] becomes active, the SSC-B stops running batch or transaction. New transactions can only be started after solving the problem and clearing this alarm condition.

If [Alarm action] is set to <Display shutdown>, the following actions occur:

- Alarm-indication output is set to ON.
- Alarm is shown on the display.
- Alarm-shutdown output is set to ON.
- Running transactions are stopped.
- Start-up of new transactions is prohibited until alarm condition is reset.

Entity	Description	Value range
[Alarm shutdown]	This entity selects the physical source for the alarm shutdown function.	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC

5.11.3.3.5 Block Valve Control

A block valve is a valve that can block the flow of product in a pipeline in both directions.

- If the [Block valve control] I/O binding is defined, then the block valve output is active when the permissive is true.
- The block valve remains active until the stream permissive is false.

Entity	Description	Value range
[Block valve control]	This entity selects the physical source for the block valve control function.	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC

5.11.3.3.6 Pump Start

This signal starts and stops the blending pump running the blend product from the storage tank to the blend point of the wild stream.

- Pump start output should be driven high when the permissive becomes true (if the [Pump start] I/O binding is defined).
- The pump is deasserted when the permissive becomes false and when not receiving wild stream pulses for a time-out period in minutes.

Entity	Description	Value range
[Pump start]	This entity selects the physical source for the blend pump start function.	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC

5.11.3.3.7 *Hydr. Pump Start*

This signal is used to control the Honeywell Enraf Hydraulic Power Pack system. The hydraulic Power Pack is used to provide pressurised oil to the actuated control valve of the blend stream.

It works identical to the [Pump start] function using the [Hydraulic pump start] I/O binding.

Entity	Description	Value range
[Hydr. pump start]	This entity selects the physical source for the hydraulic pump start function.	None, DO AC 1, DO AC 2, DO EMR, PO DC 1, PO DC 2, OPT DO EMR, OPT DO AC

5.11.3.3.8 *Factored Pulse Out #*

The SSC-B implements two blend volume output functions that can be configured to a specific digital output.

This functionality is enabled by defining the [Factored pulse out] I/O binding.

- When the functionality is enabled, the output is driven based upon the transaction blend volume and the factored pulse output setting.
- The factored pulse output setting can be one of the following values:
  - 1 pulse for each unit of blend volume
  - 10 pulses for each unit of blend volume
  - 100 pulses for each unit of blend volume
  - 1000 pulses for each unit of blend volume
- The unit of volume is defined by the device [Units of volume] configuration entity.
- The maximum frequency of the pulse output channel is 300 Hz.

Entity	Description	Value range
[Factored pulse out 1]	This entity selects the physical source for the "Blend volume output 1" function (factored pulses).	None, PO DC 1, PO DC 2
[Factored pulse out 2]	This entity selects the physical source for the "Blend volume output 2" function (factored pulses).	

5.11.4 I/O Settings

5.11.4.1 Inputs

5.11.4.1.1 Pulse Input (PI)

5.11.4.1.1.1 General

The SSC-B receives pulses from the wild stream meter and blend stream meter and ratios the two flows based upon the blend percentage set by configuration. The blend stream control valve is directly controlled by the SSC-B electronics in order to maintain that ratio. The wild stream flow is not controlled by the SSC-B electronics.

- The Pulse Input (PI) function should meter both the blend and wild stream flow.
- The blend stream must use the quad-pulse channel A input, and the single-pulse input can be used for wild stream metering.
- The pulse input functions also supports new entities for flow rate for both the wild and blend streams. These values are always in units of litre(litres)/minute (gallons/minute). These flow entities are not visible anywhere in the user Interface but may be viewable through the future versions of the Fusion4 portal.

CAUTION! ***The wild stream pulse input should always be furnished with a Gross Observed Volume pulse****, regardless of whether temperature compensation is turned on or not. Providing a Gross Standard Volume pulse to the wild stream pulse input results in errors in the final blend percentage. The amount of errors depends upon the configuration of the loading equipment and the difference in temperature between the wild and blend streams.*

Entity	Description	Value range
[Blend meter integrity check]	With this entity you can select the pulse type of the blend flow meter.	<Disable> = single pulse (default) <Enable> = dual pulse (quad); mandatory for W&M (MID)
[Blend meter cut-off frequency]	With this entity you can enter the minimum frequency at which the [Blend meter integrity check] is enabled. At slow flow it is difficult to guarantee the integrity of the dual pulse.	Recommended value = 50% of the slow flow threshold value. (default = <50> Hz)
[Blend meter error threshold]	With this entity you can provide the maximum number of dual pulse flow meter errors permitted every 1000 pulses. If more than the specified number of pulses are missing in a batch of 1000 pulses, then an alarm is generated.	3 (default)
[Blend stream meter serial #]	With this entity you can enter the serial number of the connected blend flow meter. This then is part of the calibration record.	

Entity	Description	Value range
[Wild stream meter serial #]	With this entity you can enter the serial number of the wild stream flow meter.	

5.11.4.1.2 DI (for both AC# and DC#)

Entity	Description	Value range
[DI hysteresis time]	With this entity you can set the active time in milliseconds (ms) of the input signal before accepting it as a valid input signal. The time *between two signal transitions* must be greater than the [Hysteresis time].	default = <250> ms

5.11.4.1.3 OPT RTD

Entity	Description	Value range
[RTD serial #]	With this entity you can enter the serial number of the connected PT100 temperature probe.	
[HH Alarm Threshold]	With this entity you can set the High High temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[H Alarm Threshold]	With this entity you can set the High temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[L Alarm Threshold]	With this entity you can set the Low temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[LL Alarm Threshold]	With this entity you can set the Low Low temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[Alarm Hysteresis]	With this entity you can set the hysteresis around the alarm levels. This hysteris is used to avoid alarm ON/OFF-toggling situations at an alarm level. • A High (High) alarm occurs when the value becomes higher then [HH/H Alarm Threshold]. • A Low (Low) alarm occurs when the value becomes lower then [LL/L Alarm Threshold]. • So a High (High) alarm disappears when the value becomes lower then [HH/H Alarm Threshold] - [Alarm Hysteresis], and • a Low (Low) alarm disappears when the value becomes higher then [L/LL Alarm Threshold] + [Alarm Hysteresis].	default = <0.0>

5.11.4.1.4 OPT AI DC

The Analog Input (AI) is only used for PV measurements, that is pressure and temperature (non-MID-compliant).

Entity	Description	Value range
[PV value @20 mA]	With this entity you can enter the Primary Variable value equivalent to 20 mA. For real PV determination, lineair interpolation is used between [PV value @4 mA] and [PV value @20 mA].	default = <100.0>
[PV value @4 mA]	With this entity you can enter the Primary Variable value equivalent to 4 mA. For real PV determination, lineair interpolation is used between [PV value @4 mA] and [PV value @20 mA].	default = <0.0>
[AI threshold]	With this entity the digital mode of the analog input can be defined. That is, the definition of the logic "0" and logic "1" can be defined.	default = 12
[AI logic state]	With this entity you can determine how the blend controller uses the analog input in "digital mode". • <Positive>: 0 or inactive from 4-[AI threshold] mA and 1 or active from [AI threshold] to 20 mA. • <Negative>: 1 or active from 4-[AI threshold] mA and 0 or inactive from [AI threshold] to 20 mA.	<Positive> (default) <Negative>
[AI serial #]	With this entity you can enter the serial number of the connected 4-20 mA pressure sensor.	
[HH Alarm Threshold]	With this entity you can enter the High High temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[H Alarm Threshold]	With this entity you can enter the High temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[L Alarm Threshold]	With this entity you can enter the Low temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>
[LL Alarm Threshold]	With this entity you can enter the Low Low temperature alarm threshold. When exceeded, a temperature alarm occurs.	default = <0.0>

Entity	Description	Value range
[Alarm Hysteresis]	With this entity you can enter the hysteresis around the alarm levels. This hysteris is used to avoid alarm ON/OFF-toggling situations at an alarm level. • A High (High) alarm occurs when the value becomes higher then [HH/H Alarm Threshold]. • A Low (Low) alarm occurs when the value becomes lower then [LL/L Alarm Threshold]. • So a High (High) alarm disappears when the value becomes lower then [HH/H Alarm Threshold] - [Alarm Hysteresis], and • a Low (Low) alarm disappears when the value becomes higher then [L/LL Alarm Threshold] + [Alarm Hysteresis].	default = <0.0>

NOTE: When this binding is selected for the pacing source or the temperature source, it acts in 4-20 mA mode. For all the other selections, it acts in digital mode.

5.11.4.2 Outputs

5.11.4.2.1 (OPT) DO EMR

Each individual relay can be set to be *energized* or *de-energized* during operation, by setting the [Relay mode] entity to <Energized> (default setting) or <De-energized> respectively.

If the [Relay mode] entity is set to <Energized>, the relay coil is energized when the relay state is <Deactivated>, and the relay coil is de-energized when the relay state is <Activated>.

If the [Relay mode] entity is set to <De-Energized>, the relay coil is de-energized when the relay state is <Deactivated>, and the relay coil is energized when the relay state is <Activated>.

The <Energized> option is used for *fail-safe* operation whereas the <De-Energized> option is used for *non-fail-safe* operation.

➔ Set each individual relay to the required configuration, by selecting the proper entities. See also next overview (fail-safe configuration is colored).

Physically Configured	Relay mode	Relay State	Physical Result
Normally Open (N.O.)	De-Energized	Activated	Closed
		Deactivated	Open
	Energized	Activated	Open
		Deactivated	Closed

Physically Configured	Relay mode	Relay State	Physical Result
Normally Closed (N.C.)	De-Energized	Activated	Open
		Deactivated	Closed
	Energized	Activated	Closed
		Deactivated	Open

5.11.4.2.2 OPT AO DC

- This functionality requires a CAN-OPTION-SSC board.
- The value of the 4-20 mA analog output follows one of several process variables.

  In addition, the SSC-B also supports the mapping of internal primary values to an analog output (4-20 mA). For example,

  - The actual (running) additive volume per stream.
  - The temperature per stream.
  - The flow per stream.
- To enable this functionality, the following settings must be set in the I/O setting menu for the Analog Output function:
  - The [Upper boundary] entity should be set to the maximum process variable value (in default units) to be associated with a 20 mA output.
  - The [Lower boundary] entity should be set to the process variable value (in default units) to be associated with a 4 mA output.
  - The operational mode should be set to <Follow PV>.

Entity	Description	Value range
[Operational mode]	With this entity you can select between 2 modes for the analog output.	• <Explicitly Driven> (default) --> the output value is set by the application (for example, valve control) • <Follow PV> --> the output reflects one of the Primary Values measured by the SSC)
[PV address]	With this entity you can select the process variable to be mapped on the analog output (4-20 mA).	<None> (default) <Blend volume> L <Blend flow rate> L/min <Wild flow rate> L/min <Blend percentage> % <Instan. temp.> °C <Average temp.> °C <Instan. pressure> Pa <Average press.> Pa

Entity	Description	Value range
[Lower boundary]	With this entity you can select the PV value at 4 mA. For the actual current value lineair interpolation is used between [Lower boundary] and [Upper boundary].	default = <0.0> For units, see Value range of [PV address]
[Upper boundary]	With this entity you can select the PV value at 20 mA. For the actual current value lineair interpolation is used between [Lower boundary] and [Upper boundary].	default = <0.0>L For units, see Value range of [PV address]

5.11.4.3 Communication

5.11.4.3.1 IR COMMS

Entity	Description	Value range
[IR access]	With this entity you can enable the IR interface if it was turned off.	<IR enabled> (default) <IR disabled> *NOTE: IR communication cannot be disabled from IR remote control device when LAD is not attached to the device.*
[Long IR access] *	Disabling this entity (default) uses the short login sequence of pressing only the [ATTN] key. Enabling this entity makes the controller require the long login sequence of four buttons being pressed. **Use [ATTN], [F1], [F2], [F3].**	<Long IR enabled> <Long IR disabled> (default)

* In a few installations of Honeywell Enraf controllers, it has been reported that sunlight or strong artificial light sources can “unlock” the infrared port the same way as pressing the ATTN key on the Fusion4 IR Controller. If this occurs, parameter values could accidentally be changed. It should be noted that this is an EXTREMELY rare possibility, but could happen.

The Long Infrared access parameter enables or disables an ***extended login sequence*** of characters for the infrared communications port on the bezel of the SSC. Using an extended login character sequence raises the odds of a random pattern of interference matching the correct login sequence to astronomical levels.

5.11.4.3.2 (OPT) COMMS

5.11.4.3.2.1 Introduction

Full control of and full access to all setup entities can be realized by using a hard-wired, serial EIA RS-485 communications port, which is connected to a *master system* through a data communications line.

This master system can be a PC service program, a load computer, a SCADA system, DCS, or any other type of Terminal Automation System.

The SSC-B includes several different communications protocols. These include FlexConn, FMC Smith AccuLoad, Brooks PetroCount, and Modbus RTU ASCII.

The SSC-B supports 2 serial communication ports.

- The CAN-ADD-BLEND board houses a 2-wire or 4-wire isolated RS-485 communication port.
- The CAN-OPTION-SSC board houses a 2-wire isolated RS-485 communication port.

The communication settings for all of the protocols are as follows:

- RS-485 Multi-drop, poll and reply, slave only.
- 2-wire or 4-wire, (physical switch on the board)
- 32 blenders total on one drop.
- Data rates: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, and 128000 baud.
- Data bits: 8
- Parity: none
- Stop bits: 1

Alarms are reported through the protocols of the RS-485 communications interface. Alarms may also be cleared using the RS-485 communications interface.

*CAUTION! It is strongly recommended to only transmit configuration data, from remote network systems such as TAS, **between blend transactions when the device is idle**, as any changes sent has immediate effect.*

5.11.4.3.2.2 FlexConn Instrument Address

The entity [FlexConn instrument address] selects the instrument address for the FlexConn protocol.

5.11.4.3.2.3 Communication Protocol

The entity [Communication protocol] selects the protocol that is used for communications through the serial port.

Setting values are:

- FMC Smith AccuLoad
- Brooks PetroCount
- Modbus RTU ASCII
- FMC Smith AccuLoad Comms Mini-Pak emulation
- FlexConn Protocol (Honeywell Enraf) (= default setting)

Refer to the Communications Manual for complete details regarding your specific protocol.

5.11.4.3.2.4 Baudrate

The entity [Baudrate] selects the serial port baudrate used for communications. Possible setting values are:

- Baudrate1200
- Baudrate 2400
- Baudrate 4800
- Baudrate 9600
- Baudrate 19200
- Baudrate 38400
- Baudrate 57600
- Baudrate 115200
- Baudrate 128000

5.11.4.3.2.5 Datastream Maximum Gap Time

The entity [Datastream max gap time] selects the time out between characters in one single record.

5.11.4.3.2.6 Turn-around Delay

The entity [Turn around delay] selects the time between the received request from the master system and the moment the answer is returned.

5.11.4.3.2.7 Broadcast Address

The entity [Broadcast address] selects the *secondary communications address,* recognized *by the SSC-B*. It is not necessarily unique to any particular unit. This address is used by the master system if it wants to transmit a command to more than one unit simultaneously. All SSC-B units on the system respond to broadcast messages. The SSC-B act on a message addressed to its own broadcast address, but does not acknowledge it. This permits many units to be controlled by the master system with only a single command sent. A typical use for this is setting the date or time.

Examples:

- To assign the SSC-B a Broadcast Address of 999 enter: 999
- To assign the SSC-B a Broadcast Address of 000 enter: 000

5.11.4.3.2.8 Unit Address

The entity [Unit address] selects the *primary communications address* of the SSC-B. The primary address is the value used to identify a particular unit *to the master system*. This 3-digit number must be unique to each unit on a communication loop.

Examples:

- To assign the SSC-B an Address of 10, enter: 010
- To assign the SSC-B an Address of 252, enter: 252

5.11.4.3.2.9 Protocols

5.11.4.3.2.9.1 FMC Smith AccuLoad

The FMC Smith AccuLoad protocol is closely related to the protocol defined by Smith Meter Inc. for use with their AccuLoad™ Electronic Preset.

In FMC Smith AccuLoad protocol, there are 2 different message formats, depending on whether the message originated from the master system or from a controller.

5.11.4.3.2.9.2 Brooks PetroCount

The Brooks PetroCount protocol is provided to allow you with Brooks Instrument's PetroCount® IMS Presets to easily communicate with the controller.

Existing software communications drivers used to communicate with the Brooks units can be used to communicate with the controller. All that needs to be taken into account is the entity code table for the controller.

In the Brooks PetroCount protocol, the message format is the same, regardless of whether the transmission originated from the master system or from the controller.

5.11.4.3.2.9.3 Modbus RTU ASCII

The Modbus RTU ASCII protocol is a modified subset of Modicon Inc.'s Modbus RTU Protocol. While the protocol supports a large number of commands, only 3 are supported in microprocessor-based control devices. These commands adhere to the message framing defined by Modbus, but are not necessarily used for the same purpose. For example, function code <06h> is defined by Modbus to 'Preset a Single Register'. The microprocessor devices use this function code to 'Execute a Task'. The key to implementation of this protocol is that it allows the slave devices to communicate over a communications bus that uses Modbus without interfering with other devices on the bus.

5.11.4.3.2.9.4 FMC Smith AccuLoad Comms Mini-Pak emulation

The FMC Smith AccuLoad Comms Mini-Pak emulation Protocol implements Comms Mini-Pak emulation together with the FMC Smith AccuLoad protocol. It is used for the SSC-B only.

5.11.4.3.2.9.5 FlexConn Protocol (Honeywell Enraf)

The Honeywell Enraf proprietary FlexConn protocol is used to communicate with the Fusion4 Portal PC program.

The Fusion4 Portal covers a broad range of functions:

- BoL printing and viewing
- Commissioning and diagnosing of controllers
- OPC interfacing
- Monitoring of field devices for the control room

5.11.4.3.2.9.6 Communication Wiring

The SSC-B uses the EIA-485 standard for communications. A converter is required to enable communications with peripheral devices such as modems or personal computers that use the EIA-232 interface standard.

Honeywell Enraf can provide an EIA-485 to EIA-232 converter if your application requires one.

Communications through a modem requires a modem to be installed at each end of the communications link, and an appropriate converter (if required). The modem must be programmed to auto answer, and the cabling must be designed to provide auto-answer capabilities on the terminal end.

Although often overlooked, proper system wiring is critical to the reliable operation of serial communication interfaces. Improper wiring can cause high data-error rates and reduce data throughput.

Although exact wiring requirements vary depending on the type of interface used, each of the following is important to the overall success of a communications system:

- Cable lengths and types
- Shielding
- Twisted Pair Wiring

RS-485 interfaces are typically used in multi-drop configurations. The system wiring can become very complex. When installing a 2-wire cable for use with the SSC-B, receive and transmit share the same conductor pair. The wires must be a *twisted pair*.

Wiring for RS-485 must be designed as a *Daisy chain*. Cable stubs are permitted so long as they are 4.5 m (15 feet) or less in length.

Conductor pairs must be terminated with a 100 ohm resistor at the most distant end, to ensure proper line impedance for maximum signal reception.

Using the recommended cable (Belden Cable 9841 for 2-wire), an RS-485 interface may support multiple devices (stations) over a maximum wire length of 1200 m (3600 feet)

Entity	Description	Value range
[FlexConn instrument addr.]	With this entity you can enter the device address for the FlexConn protocol.	<0> ... <1900> (default = <0>)
[Communication protocol]	With this entity you can select the protocol for the communication port.	<FlexConn> (default) <FMC Smith> <Brooks> <Modbus RTU> <Modbus legacy> <Minipak emul.>
[Baudrate]	With this entity you can select baudrate for the communication port.	<Baudrate 1200> <Baudrate 2400> <Baudrate 4800> <Baudrate 9600> (default) <Baudrate 19200> <Baudrate 38400> <Baudrate 57600> <Baudrate 115200> <Baudrate 128000>
[Parity]	With this entity you can select the parity type.	<Odd> <Even> <None> (default)
[Stop bits]	With this entity you can select the number of stop bits to be used with each byte.	<One> (default) <Two>
[Datastream max gap time]	With this entity you can enter the time-out between characters in one single record (ms).	<0> ms ... <10000> ms (default = <1000> ms)
[Turn around delay]	With this entity you can enter the time between the received request from the master and the moment the answer is sent (ms).	<0> ms ... <1000> ms (default = <100> ms)

Entity	Description	Value range
[Broadcast address]	With this entity you can enter the ***secondary*** address recognized by the SSC. It is not necessarily unique to any particular unit. This address is used by the master if it wants to transmit a command to more than one unit, simultaneously. The SSC does not respond to a message addressed to its broadcast address.	default = <998>
[Unit address]	With this entity you can enter the ***primary*** address of the SSC. The primary address is the value used to identify a particular unit to the master computer. This 3-digit number must be unique to each unit on a communication loop.	default = <123>
[Modbus byte order]	With this entity you can select the byte representation of the information retrieved by the modbus protocol: • Little endian: the LSB is sent first • Big endian: the MSB is sent first	<Little endian> (default) <Big endian>

5.11.5 Control Settings

5.11.5.1 Blend Control

Entity	Description	Value range
[K-factor]	With this entity you can enter the K-factor of the blend flow meter supplied by the vendor, in pulses per [Units of volume].	The K-factor must be the number of pulses per litre (gallon), regardless of the configured unit of volume selection. (default = <750.000>)
[Permissive condition]	With this entity you can select the logical relation between the permissive and system interlock functions. *Note: The entity [Permissive condition] is only relevant when the System Interlock I/O binding is configured other then <None>.*	• <AND> (default) (Both signals should be available to permit the device) • <OR> (One of those signals should be available to permit the device)
[Blend point]	With this entity you can select the insertion point of the physical blend piping.	• <Upstream> = before wild custody transfer meterstream • <Downstream> (default) = after wild stream custody transfer meter
[Pump run timeout]	With this entity you can enter the time in minutes between stopping the blend stream flow and closing the pump.	<1> min ... <255> minutes (default = <10> min)
[Hydr. Pump run timeout]	With this entity you can enter the time in minutes between stopping the blend stream flow and closing the hydraulic pump.	<1> min... <255> minutes (default = <10> min)
[Pulse timeout]	With this entity you can determine how long in seconds the SSC-B is active after the blend stream pulses stop and the permissive is removed. Once the permissive is removed, the SSC-B does not report a control failure alarm. After the permissive is removed, the SSC-B closes the DCV immediately. The remaining blend stream volume during the Pulse Timeout period is used to determine the final blend percentage.	<1> s ... <90> s (default = <2> s)
[Makeup period]	With this entity you can configure the maximum period in seconds that the SSC-B switches to make-up mode after the permissive is removed. Normally, flow through the SSC-B is stopped prior to removal of the permissive signal. As long as the make-up period lasts, the SSC-B tries to maintain the blend ratio. The make-up mode is stopped after the wild stream is stopped and the blend ratio is equal or bigger than the target ratio, or if the make up period is elapsed.	<1> s ... <30> s (default = <10> s)

Entity	Description	Value range
[Factored pulse out 1, 2]	With this entity you can select the amount of pulses for each unit of blend volume.	<1> Pulse/Unit (default) <10> Pulses/Unit <100> Pulses/Unit <1000> Pulses/Unit

5.11.5.2 Wild Stream

Entity	Description	Value range
[K-factor]	With this entity you can enter the K-factor of the wild stream. Used by the SSC to determine the volume from the wild stream or product flow meter. This K-factor must be the number of pulses per litre (gallon), regardless of the configured unit of volume selected.	Meter pulses per unit volume of product *Example:* One input pulse from product meter = 2 litres --> Enter: 0000.500 *Note: To determine the [K-factor] for any other value, divide 1 by the flow meter pulse output.* (default = <100>)
[Meter factor]	With this entity you can enter the K-factor *correction* of the wild stream in case the wild stream flow is measured by a real flow meter. The meter factor is determined during the *calibration* of the wild stream flow meter.	default = <1.00000>
[Pulse timeout]	With this entity you can configure how long the SSC-B in seconds delays after the removal of permissive and the absence of wild stream flow before determining final transaction totals.	<1> s ... <90> s (default = <5> s)

5.11.5.3 Calibration

Entity	Description	Value range
[High flow rate]	With this entity you can enter the maximum flow rate that is allowed through the blend stream. The flow rate is determined on a per minute basis. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L/min ... <9999> L/min (default = <60.00> L/min)
[Low flow rate]	With this entity you can enter the minimum flow rate that is allowed through the blend stream. The flow rate is determined on a per minute basis. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L/min ... <100> L/min (default = <15.00> L/min)
[Inner control window]	With this entity you can determine when the DCV is pulsed open or closed. If the flow rate is determined to be less than the value set by the inner control window, the control valve remains locked at the current flow rate. If the flow rate is determined to be outside the value set by the Inner Control Window, the SSC-B signals the DCV to either open or close, depending if the deviation volume is positive or negative. The maximum value for the [Inner control window] must not be greater than the [Outer control window]. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L ... <9999> L (default = <10> L)
[Outer control window]	With this entity you can determine when the DCV is continuously signaled to open or close. If the flow rate is determined to be less than the value set by outer control window, the DCV remains under control of [Inner control window]. If the flow rate is determined to be outside the value set by the [Outer control window], the SSC-B signals the DCV to either open or close by holding the proper solenoid continuously open or closed, depending if the deviation volume is positive or negative. The maximum value for the [Outer control window] must be greater than the [Inner control window]. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L ... <9999> L (default = <25> L)

Entity	Description	Value range
[Low flow volume]	With this entity you can enter the amount of volume that is delivered at the low flow rate during the calibration procedure before the SSC-B begins the transition to the high flow rate. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L ... <9999> L (default = <25.00> L)
[End flow volume]	With this entity you can enter the amount of volume before the end of delivery of the calibration procedure when the SSC-B transitions from the high flow rate to the low flow rate. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> L ... <9999> L (default = <25.00> L)
[Final shutdown volume]	With this entity you can determine the amount of volume before the end of delivery, when the SSC-B signals the DCV to close. Normally used when using slow valves to prevent “over” flow at the end of the calibration process. This entity is only applicable when doing a calibration of the blend stream flow meter.	<0> L ... <9999> L (default = <20.00> L)
[Flow calc. smoothing val.]	With this entity you can enter how many successive samples are averaged before calculating an actual deviation volume. This entity eliminates incremental dips and spikes in the deviation volume calculation. This entity is only applicable when doing a calibration of the blend stream flow meter.	<1> ... <99> (default = <10>)

5.11.5.4 Window Control

For measuring the flow of the wild stream, the SSC-B uses dual-pulse input or quadrature input (90° signal shift). By having this input the SSC-B provides pulse input integrity checking which is required for custody transfer and therefore for MID compliance.

The pulse security is governed by standards, ISO 6551 in particular. ISO 6551 implies different levels of pulse security with the most common acceptable in the industry being ISO 6551 Level B pulse security. The pulse integrity checking flags alarms on:

- Dual (A/B) pulse trains not having phase shift, that is, matching signals (to reflect possibility of short circuit);
- Missing or extra pulses on A and/or B (to reflect possibility of broken wire or unstable connection).

A series of control windows must be set up in the entity settings. Each control window value establishes the outer limit in deviation volume for that window. When the deviation volume is inside that window, the controller reacts in a specific way when controlling the blend stream control valve. The deviation volume falling in a specific control window changes the active and rest solenoid dwell values used.

5.11.5.4.1 Dead Band Control Window Limit

The Dead Band Control Window Limit configures the allowed volume deviation from target blend volume. When the observed blend volume is less than "Dead band Control Window Limit", the control output from the controller is locked. No correction is made to the blend stream control valve. This value effectively establishes the “dead band” in which the blend stream volume can deviate without correction. The dead band is plus or minus this value.

5.11.5.4.2 Inner Control Window Limit

The "Inner Control Window Limit" volume should be greater than the "Dead band Control Window Limit" and less than "Middle Control Window Limit". When deviation volume is greater than the "Dead Band Control Window Limit" and less than The "Inner Control Window Limit" volume, the controller uses one-half the "active dwell" configuration setting and double the "rest dwell" configuration settings for controlling the blend stream control valve.

5.11.5.4.3 Middle Control Window Limit

The "Middle Control Window Limit" volume should be greater than "Inner Control Window Limit" and less than "Outer Control Window Limit". When the deviation volume is greater than the "Inner Control Window Limit" and less than the "Middle Control Window Limit", the controller uses the "active dwell" value and the "rest dwell" configuration settings for controlling the blend stream control valve.

5.11.5.4.4 Outer Control Window Limit

The "Outer Control Window Limit" volume should be greater than "Middle Control Window Limit". When the deviation volume is greater than "Middle Control Window Limit" value and less than "Outer Control Window Limit", the controller uses double the "active dwell" value and one-half the "rest dwell" configuration settings for controlling the blend stream control valve.

NOTE: During operation a real-time Deviation Graph can be viewed in the Diagnostics menu (5.15). This graph illustrates the setting of each control window and traces the real-time control of the blend ratio in them. This is a useful tool for observing the effectiveness of control window settings.

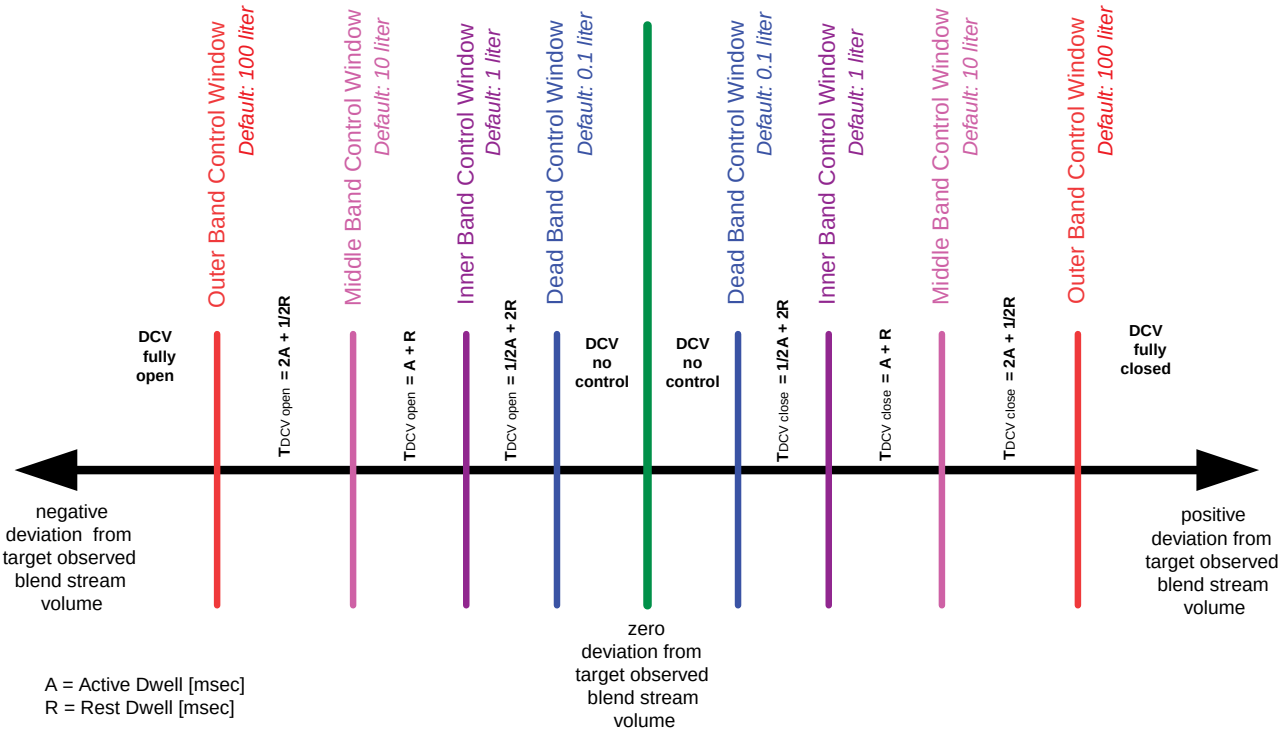


FIGURE 5-10 Visualization of the control windows

Entity	Description	Value range
[Dead band window]	With this entity you can configure the allowed volume deviation from the target blend volume. When the observed blend volume is less than [Dead band window] limit, the control output from the controller is locked. No correction is made to the blend stream control valve. This value effectively establishes the “dead band” in which the blend stream volume can deviate without correction. The dead band is plus or minus this value.	<0.01> L ... <10000> L (default = <0.1> L)

Entity	Description	Value range
[Inner control window]	With this entity you can configure the allowed volume deviation from target blend volume. The [Inner control window] limit volume should be greater than the [Dead band window] limit and less than [Middle control window] limit. When deviation volume is greater than the [Dead band window] limit and less than The [Inner control window] limit volume, the controller uses one-half the [Active dwell] configuration setting and double the [Rest dwell] configuration settings for controlling the blend stream control valve.	<0.01> L ... <10000> L (default = <1.00> L)
[Middle control window]	With this entity you can configure the allowed volume deviation from target blend volume. The [Middle control window] limit volume should be greater than the [Inner control window] limit and less than [Outer control window] limit. When the deviation volume is greater than the [Inner control window] limit and less than the [Middle control window] limit, the controller uses the [Active dwell] value and the [Rest dwell] configuration settings for controlling the blend stream control valve.	<0.01> L ... <10000> L (default = <10.00> L)
[Outer control window]	With this entity you can configure the allowed volume deviation from target blend volume. The [Outer control window] limit volume should be greater than [Middle control window] limit. When the deviation volume is greater than the [Middle control window] limit value and less than [Outer control window] limit, the controller uses double the [Active dwell] value and one-half the [Rest dwell] configuration settings for controlling the blend stream control valve.	<0.01> L ... <10000> L (default = <100.00> L)
[Dev. count smoothing val.]	With this entity you can enter how many successive samples are averaged before calculating an actual deviation volume. This entity eliminates incremental dips and spikes in the deviation volume calculation.	<1> ... <99> (default = <10>)

Entity	Description	Value range
[Deviation count reset]	With this entity you can configure if the deviation count is reset at the start of a new transaction. No-reset = The deviation volume is never reset to 0. Reset deviation = Every transaction resets the deviation volume to 0.	<No Reset> <Reset Deviation> (default)

5.11.5.5 DCV Control

5.11.5.5.1 Digital Control Valves

- A digital control valve (DCV) is an electrically-actuated, hydraulically-operated control valve.
- In any operation mode, the solenoids is controlled for an accurate control of the blending DCV.

The SSC-B utilize two different types of control valves depending upon the application. Some blenders use a globe or plug valve in which the product line pressure is used to modulate the valve open and closed. The control valve is operated by cycling product pressure to and from the control chamber on top of the valve. See FIGURE 5-11.

Other blenders utilize a hydraulic power-pak pump and reservoir for valve actuation power. This method is typically used on V-port ball valves. The valve is controlled by cycling hydraulic fluid to and from the actuator on the valve.

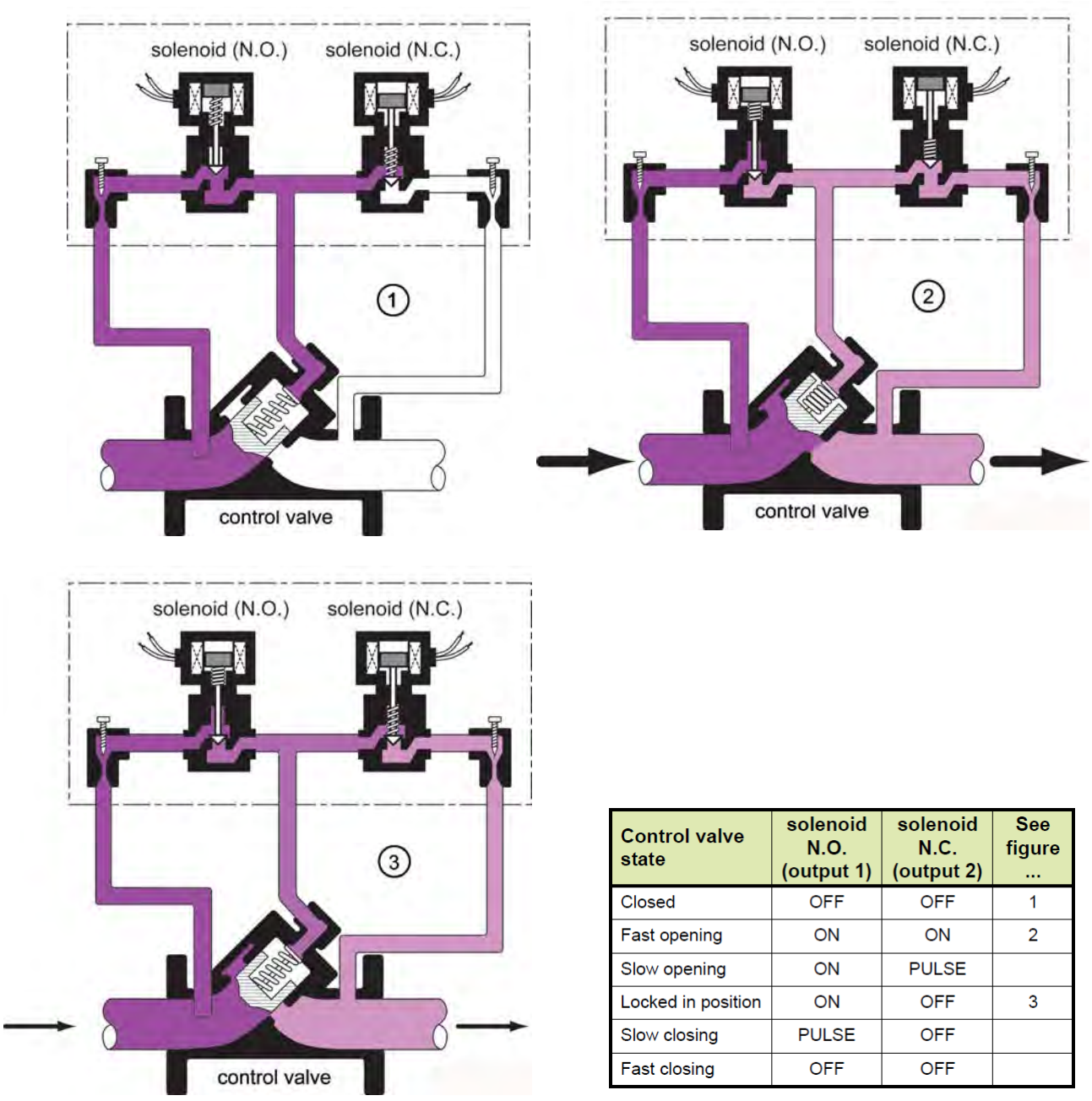
5.11.5.5.2 Solenoid Valves

To manage the flow of the actuation fluid to the control valve, electrically operated 2-way solenoid valves are used. Two valves are required; a normally open (N.O.) solenoid controls the closing of the control valve; a normally closed (N.C.) solenoid controls the opening of the control valve. When the N.O. solenoid is pulsed, the control valve is closing. When the N.C. solenoid is pulsed, the control valve is opening. This statement is true for both product actuated valves and hydraulic fluid actuated valves. This method of using both N.O. and N.C. valves offers a fail-safe operation, in that upon power failure the solenoid valves de-energize and the control valve goes closed.

5.11.5.5.3 Solenoid Positions

The position of the N.O. and N.C. solenoids on the control valve are different for *product-actuated valves* and *hydraulic fluid-actuated* valves. Globe and plug style valves have the N.O. solenoid on the upstream leg of the control loop and the N.C. solenoid on the downstream leg. Hydraulic actuated control valves have the N.C. solenoid between the high pressure line from the power-pak and the actuator. The N.O. solenoid is in the return line to power-pak reservoir.

This is mentioned for reference only and does not vary the operation or electrical connections.



Control valve state	solenoid N.O. (output 1)	solenoid N.C. (output 2)	See figure ...
Closed	OFF	OFF	1
Fast opening	ON	ON	2
Slow opening	ON	PULSE	
Locked in position	ON	OFF	3
Slow closing	PULSE	OFF	
Fast closing	OFF	OFF	

FIGURE 5-11 Blend stream control principle

5.11.5.5.4 Signal Description

The SSC-B is capable of driving the normally open (N.O.) solenoid and the normally closed (N.C.) solenoid.

5.11.5.5.5 Control Valve States

There are 6 “states” that the blend stream control valve can be at. See table in FIGURE 5-11.

5.11.5.5.6 Solenoid Dwell

The SSC-B output circuit can energize the solenoids in two different ways. The output can be turned on and held on continuously, or it can be cycled ON-OFF-ON-OFF. This cycling or pulsing of the output is called “dwell”. The time period that the solenoid allows flow through it is called *active dwell* and is part of the configuration of the device.

Because the normally open solenoid allows flow through it when de-energized and the normally closed solenoid allows flow through it when energized, the SSC-B treats active dwell and rest dwell differently. This difference is depicted in FIGURE 5-12.

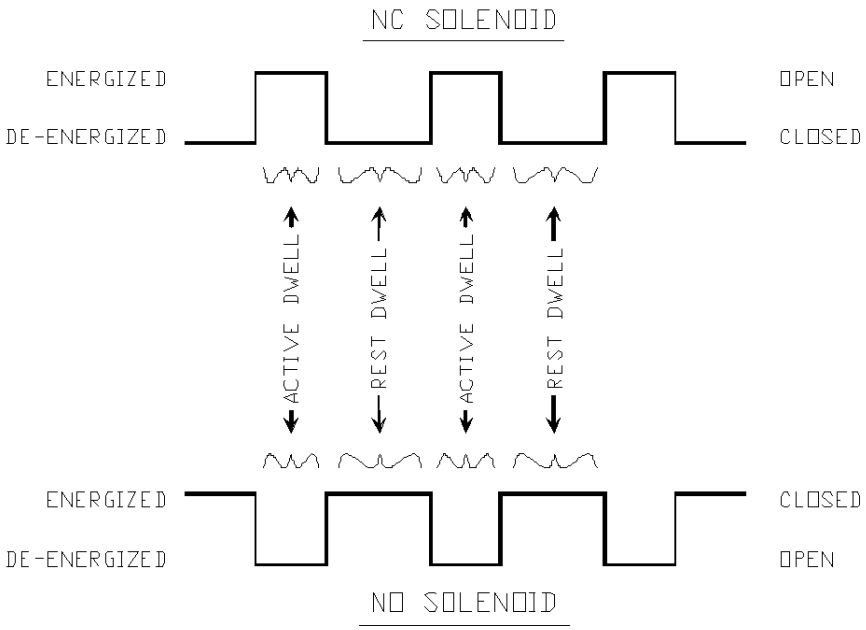


FIGURE 5-12 Solenoid active/rest dwell cycles

5.11.5.5.7 Blend Flow Pulses

The SSC-B is a batch blender. It requires a permissive signal at the beginning of the batch, to zero the delivery totals for the batch and (optionally) resets the deviation count. When permissive is removed at the end of the batch, a blend percentage is calculated for the delivered volumes and compared to the target percentage for the purpose of alarm generation.

The deviation volume is a positive or negative value that represents the error between the actual blend stream and wild stream volumes vs. a

“perfect” blend. The deviation volume is in units of Gross Observed Volume. Negative values mean that the blend stream is running behind target. Positive values mean that the blend stream is ahead or too great.

Control valve action is based upon the magnitude and polarity of the error. Stated simply, if the value is negative, the blend control valve is opened. If the value is positive, it is closed. If the value falls very near zero, the control valve is locked in its present position.

Entity	Description	Value range
[Active dwell]	With this entity you can determine how long in milliseconds a solenoid is held in the state (energized or de-energized) that allow flow through it. In case of the normally-closed (N.C.) solenoid, it is the energized open state. In case of the normally-open (N.O.) solenoid, it is the de-energized open state.	<50> ms ... <1000> ms (default = <100> ms)
[Rest dwell]	With this entity you can determine how long in milliseconds a solenoid is held in the state (energized or de-energized) that stops flow through it. In the case of the normally-closed (N.C.) solenoid, it is the de-energized closed state. In the case of the normally-open (N.O.) solenoid, it is the energized closed state.	<50> ms ... <1000> ms (default = <100> ms)

5.11.5.6 Clean Arm

The term Clean Arm (Clean Start) is used to indicate the technique of ending the fuel transaction with the loading arm free of contaminating additives, blend product, and so on. Thus the loading arm is “Clean” during the “Start” of the next transaction.

Blend chemical is typically injected *upstream* of the main product flow control valve and product flow meter. This is due to regulations by most states preventing injection of any fluids downstream of the custody transfer meter. The net result is that blend chemical may be trapped in the loading arm, piping, meter, and control valve. In some cases this can be a significant volume. The next truck compartment loaded from the arm receives these chemicals. In the case of detergent additives, the effects are minimal. But in the case of ethanol or biodiesel, this trail-back of chemical into the next compartment or truck is detrimental.

The solution to trail-back of blended products is *to stop blending early enough in the delivery to allow all of the blend stream chemical to be flushed* into the truck compartment by the main or wild stream flow. In this way the loading arm is clean for the next delivery.

Stopping the blend flow prior to the wild stream stopping at the end of the delivery requires that the blender know several pieces of information in advance:

- The blender must know the *compartment volume* being loaded. This is required to know how much blend stream volume is necessary to meet the recipe requirements.
- The blender must know how much *pipe volume* there is between the point of injection of the blend stream into the wild stream and the end of the loading arm coupling. This is the minimum volume that must be flushed at the end of the load to ensure all of the blend is in the truck.
- The blender also requires the *target recipe* or *percentage of blend stream* to the total volume delivered for the compartment.

Each of these pieces of information is needed prior to the start of the delivery. Although, the recipe may be fixed in many applications, it can vary from delivery to delivery. Compartment volumes certainly vary from truck to truck and even in the same truck. For this reason the SSC-B typically requires full communications control with the terminal automation system, in order to accurately perform Clean Start.

[Clean arm] is used to clean out the arm of any blend product, meaning the next transaction starts with no remaining blend product in the line.

The following entities are relevant:

- [Preset volume]: the volume of the load;
- [Flush volume]: the volume needed to clean the arm;
- [Pre-shutdown volume]: the volume flowing through the valve while closing.

In general there are two different ways to handle the clean arm functionality:

- **Volume control**: For the volume control there are three different options:
  - *No pre shutdown*: the clean-arm state is reached when the load volume >= (preset volume - clean start volume)
  - *Fixed pre-shutdown*: the clean-arm state is reached when the load volume >= (preset volume - clean start volume - pre shutdown volume). For slow valves, you can configure an additional volume to close the valve a little bit earlier to correct for the blend stream volume during the process of closing the valve.
  - *Calculated pre shutdown*: the clean arm state is reached when the load volume >= (preset volume - clean start volume – pre shutdown volume). The same as fixed pre-shutdown, only now, the system calculates the pre-shutdown volume at the end of every transaction to get a more precise shutdown volume. It can be seen as a correction factor for the valve closing time.

- **Permissive control**: The clean arm state is started as soon as the permissive is lost. After the permissive the system is measuring the wild stream volume from that point. At the end it should match the flush volume configured.

NOTE: Should be used only when Preset Load Volume (PLV) cannot be provided. In this option the PLV is not known thus the amount of blend product needed to makeup for the Flush Volume is blended at the beginning of the load. Therefore, when permissive signal is removed, the blender then expects the flush volume in to flow, bringing the blend percentage down to the target percentage.

Entity	Description	Value range
[Preset volume]	With this entity you can store the volume of product to be loaded during the transaction. The blend percentage is adjusted according to the amount entered into Preset Volume in order to increase the amount of blend stream product going into the load prior to flushing the arm at the end of the delivery. This entity is only applicable if the [Flush volume] is non-zero.	<0> L ... <999999> L (default = <0.00> L)
[Flush volume]	With this entity you can enter the amount of wild stream volume to realize the flushing by stopping the blending before the end of the transaction. The [Flush volume] is the amount of wild stream product that is to remain blend-product free in order to realize a clean arm when the flow stops. When [Flush volume] equals zero, the clean arm operation is disabled.	<0> L ... <999> L (default = <0.00> L)

Entity	Description	Value range
[Pre-shutdown control]	With this entity you can configure the mode of pre-shutdown control. This entity is only applicable if the [Clean start control] is configured for <Volume>. • No pre-shutdown control = The SSC-B enters the clean arm operation when the measured volume is equal to the [Preset volume] minus the [Flush volume]. • Fixed pre-shutdown control = The SSC-B enters the clean arm operation when the measured volume is equal to the [Preset volume] minus the [Flush volume] and the [Pre-shutdown volume]. • Calculated pre-shutdown control = The SSC-B enters the clean arm operation when the measured volume is equal to the [Preset volume] minus the [Flush volume] and the [Pre-shutdown volume]. At the end of every transaction the [Pre-shutdown volume] is calculated to get a more precise number on when to stop blending.	<None> (default) <Fixed> <Calculated>
[Pre-shutdown volume]	With this entity you can configure the pre-shutdown volume used to correct the volume that is measured while closing the valve.	<0> L ... <9999> L (default = <0.00> L)
[Clean start control]	With this entity you can configure how the SSC-B knows when to stop blending while doing a clean arm operation. • Permissive = The SSC-B stops blending when the permissive is removed. The SSC-B expects the [Flush volume] to flow to bring the blend percentage down to the target blend percentage. • Volume = The SSC-B is monitoring the delivered volume and determine when to stop blending, regardless of the permissive signal. To enable this functionality the SSC-B needs to know the [Preset volume].	<Permissive> (default) <Volume>

5.11.5.7 Continuous Blend

The continuous blend mode is available for applications where very large volumes of product are being continuously flowed. Unlike batch applications, where the product flows typically flow for several thousand

litres or gallons before shutting down, continuous applications can flow for 10's or 100's of thousands of litres or gallons.

To maintain the accuracy of the blend during such large transactions, it is technically more effective to calculate the blend ratio against a smaller wildstream volume. Therefore, the continuous blend mode can be used to initiate [Continuous blend mode] and determine the pseudo batch size [Continuous blend window] that the blend ratio is calculated against. Thus if the [Continuous blend mode] is enabled, and the [Continuous blend window] is set to 1000, the control algorithm controls the blend ratio against the last 1000 litres (gallons) only, while still maintaining the overall transaction totals.

Entity	Description	Value range
[Continuous blend mode]	With this entity you can enable continuous blend mode when doing very long transactions. • Enable = The SSC-B is used [Continuous blend window] to do blend control. • Disable = The SSC-B is used to do the batch totals to do blend control.	<Enable> <Disable> (default)
[Continuous blend window]	With this entity you can configure the window of volume over which the control is done. *Example: If you configure this entity for 500L the SSC-B controls over the last 500L only to maintain an accurate blend ratio.*	<0> L ... <10000> L (default = <500.00> L)

5.11.6 Recipes

- There are 5 recipes for blending, and their configuration entities exist of:
  - Recipe name
  - Blend ratio (%)
  - Product symbol
- The recipe definition can be changed between transactions.

Entity	Description	Value range
[Recipe 1]	With this entity you can define the recipe name, blend ratio, and product symbol. This recipe is selected when using blend rate 1 permissive.	• Name = 20 characters • Blend ratio = 0-100 % (default = <0.0>) • Product symbol = API symbol
[Recipe 2]	With this entity you can define the recipe name, blend ratio, and product symbol. This recipe is selected when using blend rate 2 permissive.	see [Recipe 1]

Entity	Description	Value range
[Recipe 3]	With this entity you can define the recipe name, blend ratio, and product symbol. This recipe is selected when using blend rate 3 permissive.	see [Recipe 1]
[Recipe 4]	With this entity you can define the recipe name, blend ratio, and product symbol. This recipe can only be selected by Comms.	see [Recipe 1]
[Recipe 5]	With this entity you can define the recipe name, blend ratio, and product symbol. This recipe can only be selected by Comms.	see [Recipe 1]

5.11.7 Volume Conversion

5.11.7.1 Introduction

The SSC-B volume conversions are meant for the **conversion of the measured Gross Observed Volume (GOV) to the Gross Standard Volume (GSV)**.

The **Gross Standard Volume is defined at reference conditions for temperature and pressure**, and for that reason it is **suitable for high-accurate custody transfer** of the blend stream product.

The SSC-B implements volume conversions for the following product groups or Commodity groups:

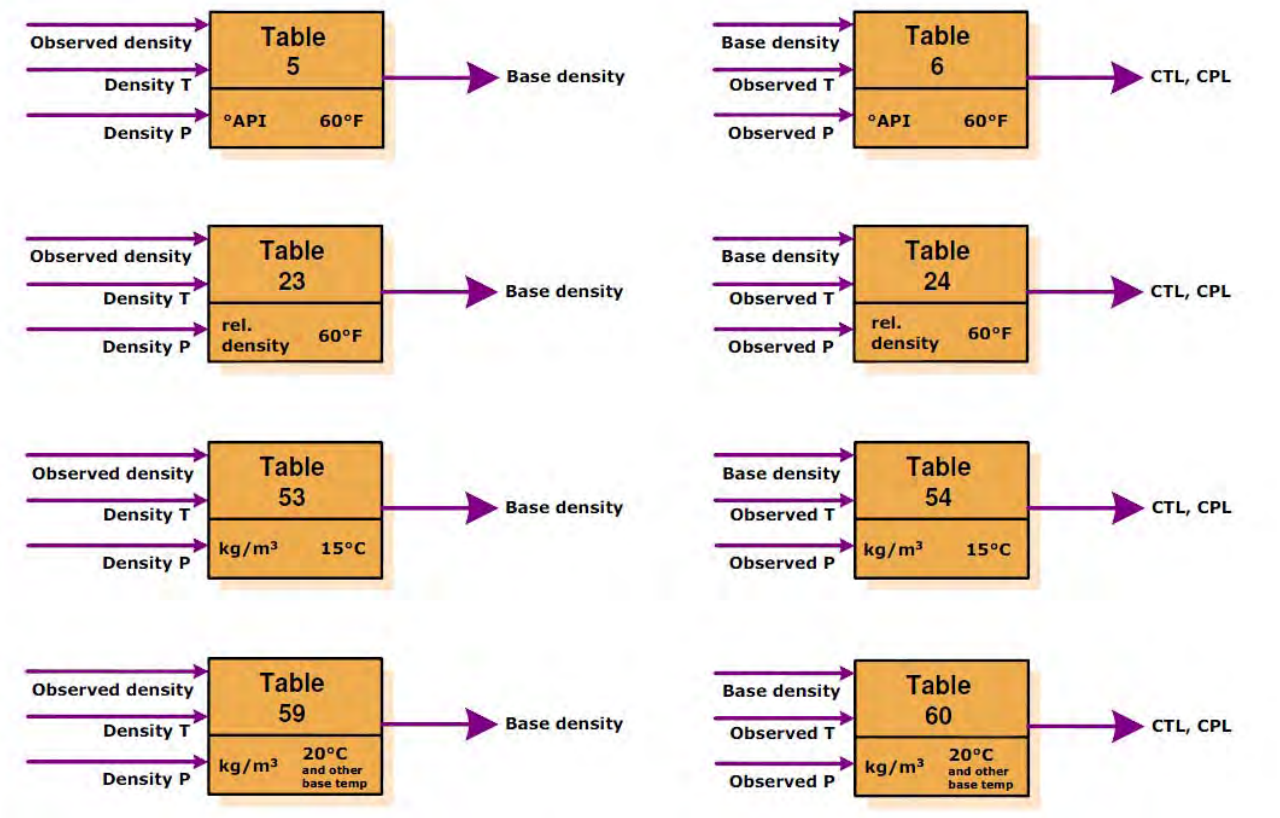
A = Crude oil
B = Refined products
C = Special applications (thermal expansion factor needed)
D = Lubricating oils
E = NGL and LPG
FAME = Fatty Acid Methyl Esters

The SSC-B implements several volume conversion standards:

Standard	Volume correction table used	Commodity group
ASTM D 1250-04	5/6	A
ASTM D 1250-04	5/6	B
ASTM D 1250-04	5/6	C
ASTM D 1250-04	5/6	D
ASTM D 1250-04	23/24	A
ASTM D 1250-04	23/24	B
ASTM D 1250-04	23/24	C
ASTM D 1250-04	23/24	D
ASTM D 1250-04	53/54	A

Standard	Volume correction table used	Commodity group
ASTM D 1250-04	53/54	B
ASTM D 1250-04	53/54	C
ASTM D 1250-04	53/54	D
ASTM D 1250-04	59/60	A
ASTM D 1250-04	59/60	B
ASTM D 1250-04	59/60	C
ASTM D 1250-04	59/60	D
ASTM GPA TP-27 (2007)	23/24	E
ASTM GPA TP-27 (2007)	53/54	E
ASTM GPA TP-27 (2007)	59/60	E
EN 14214 (2008)	-	FAME

The units of the (manually) measured data together with the desired base or reference temperature defines the table set to be used:



Legends	
T	Temperature
P	Pressure
CTL	Temperature correction factor
CPL	Pressure correction factor

5.11.7.2 Commodity Groups Calculations Diagrams

5.11.7.2.1 Commodity Groups A, B, D (Crude Oil, Refined Products, Lubricating Oils)

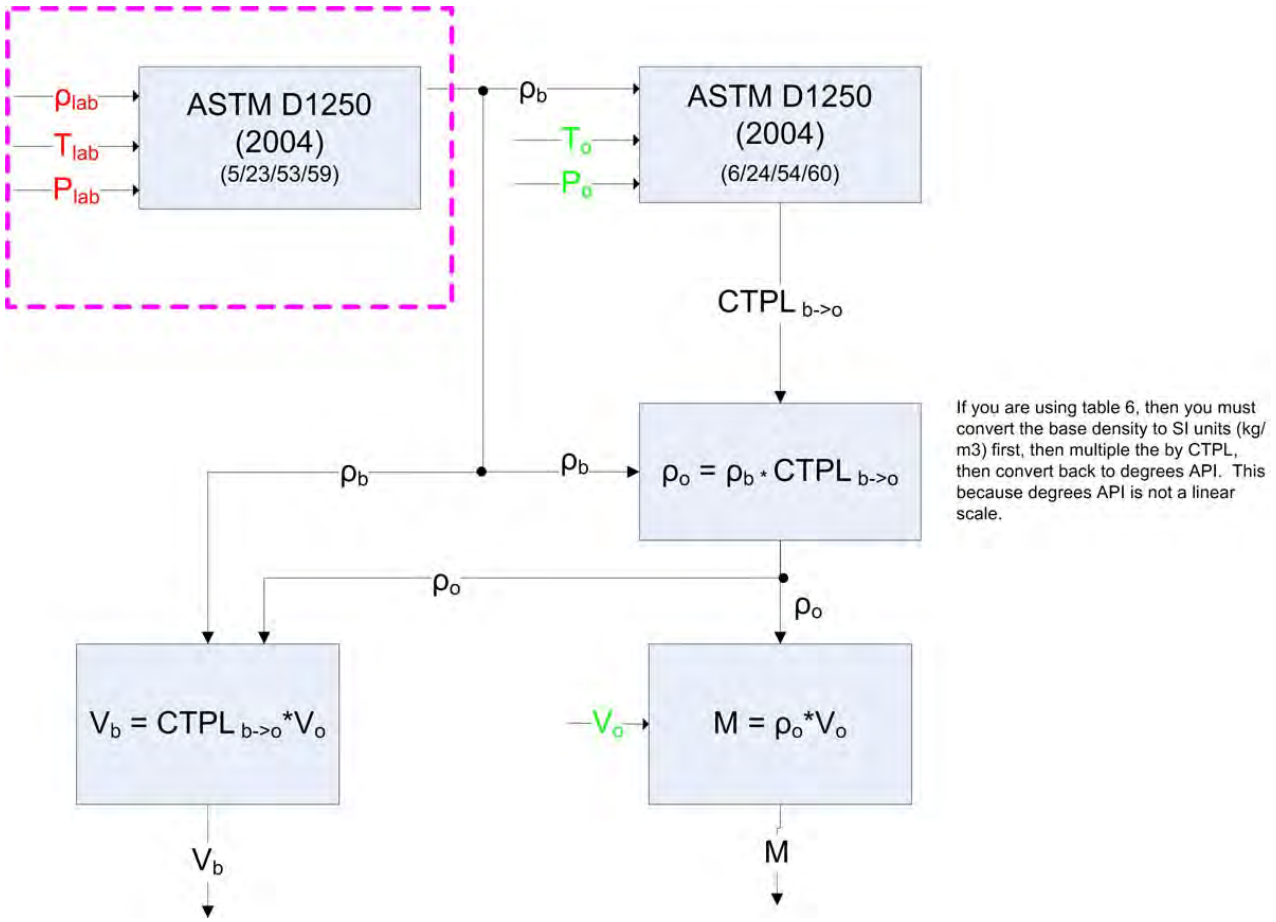


FIGURE 5-13 VCF calculation for commodity groups A, B, and D

5.11.7.2.2 Commodity Group C (Special Applications)

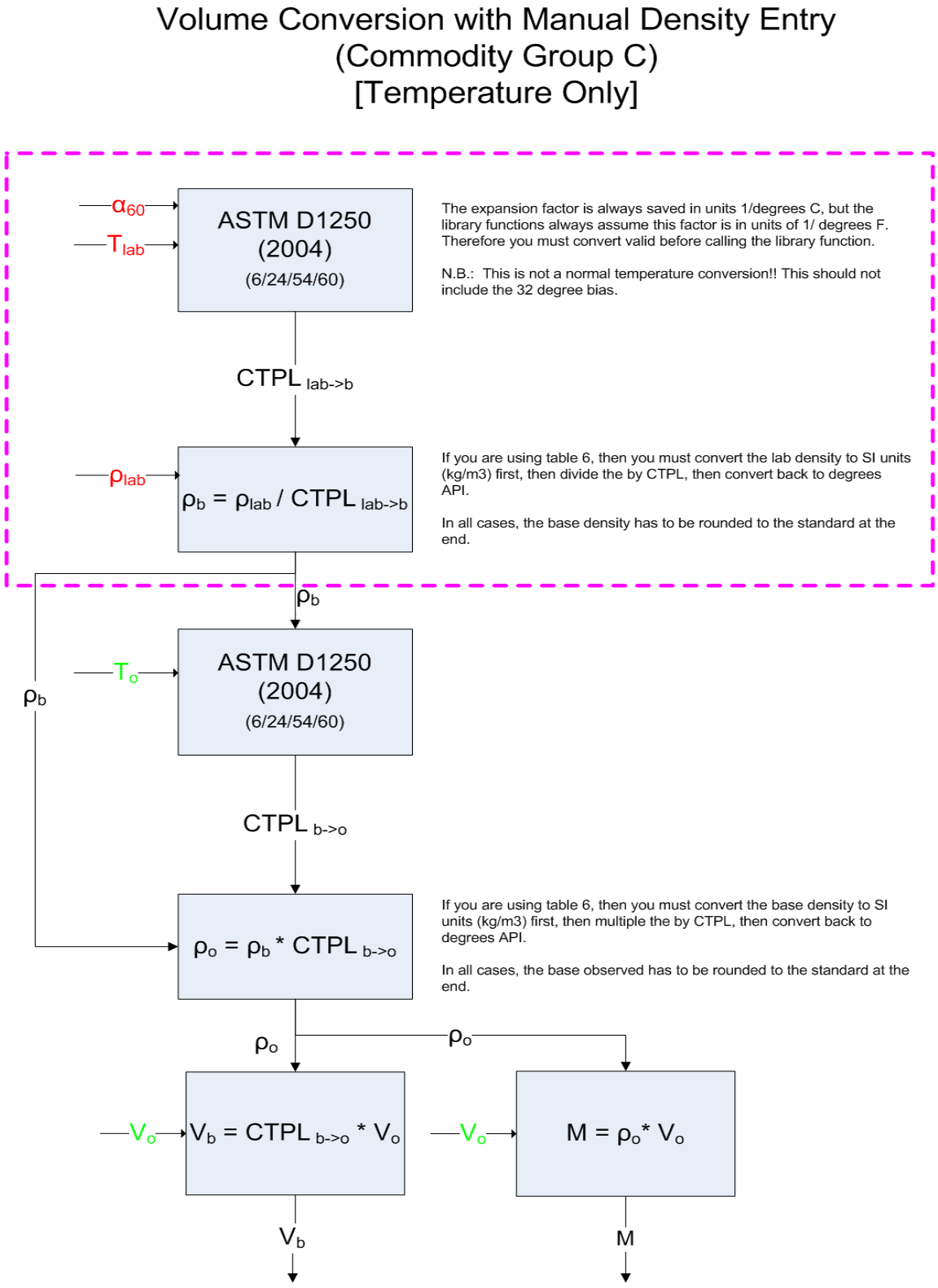


FIGURE 5-14 VCF calculations for commodity group C

5.11.7.2.3 Commodity Group E (NLG & LPG)

Both temperature and pressure compensation are possible for commodity group E (NGL & LPG) by use of the MPMS 11.2.5 and MPMS 11.2.2 tables. Calculation of the CTL for commodity group E is straightforward using the GPA TP-27 tables. These tables are available for the standard reference temperatures (60F, 15C, 20C) and table 59E can be used to calculate a base density at a non-standard base temperature.

However, the calculation of the pressure conversion factor cannot be done directly through the use of the GPA-T27 tables. The MPMS chapter 11.2.2 and 11.2.5 must be used to calculate the equilibrium pressure and the compressibility of the fluid. Since MPMS 11.2.5 is only possible using non-meteric units, the base density must always be calculated for 60 F regardless of the selected reference temperature. This density at 60F is then used as an input to MPMS 11.2.5 to calculate the equilibrium pressure of the product at the observed temperature.

Sometimes the containment vessel for the product contains a means of altering the vapor pressure in the vessel to some value other than the equilibrium pressure (Pe) at the current temperature (To). The difference between the calculated equilibrium pressure at the observed temperature and the actual measured pressure (Po) in the vessel results in a pressure difference (ΔP) that is then used calculate the compressibility factor (Fp) of the product at the observed conditions using MPMS 11.2.2. Finally the compressibility factor and the pressure differential between the observed pressure and the equilibrium vapor is used to calculate the CPL for blend product.

Volume conversion for commodity group E is only possible when the observed density, temperature, and pressure are in the range supported by the GPA TP-27 tables used to do the volume correction. The following table shows the valid range for these tables. Not all sets of observation values in these ranges result in a proper value. In some instances the observed are all in the bounds of the table but the calculations do not converge. This is expected behaviour for these tables.

Value	GPA TP-27 23E		GPA TP-27 53E		GPA TP-27 59E	
	Normal	Ext. Range	Normal	Ext. Range	Normal	Ext. Range
ρ_{min}	0.21 [rel]	0.21 [rel]	209.7 [kg/m^3]	209.7 [kg/m^3]	209.7 [kg/m^3]	209.7 [kg/m^3]
ρ_{max}	0.74 [rel]	0.75 [rel]	739.3 [kg/m^3]	749.3 [kg/m^3]	739.3 [kg/m^3]	749.3 [kg/m^3]
T_{min}	-50.8 ºF	-75.82 ºF	227.15 [K]	213.25 [K]	227.15 [K]	213.25 [K]
T_{max}	199.4 ºF	206.01 ºF	366.15 [K]	369.82 [K]	366.15 [K]	369.82 [K]
P_{min}	None	None	None	None	None	None
P_{max}	None	None	None	None	None	None

CAUTION

CAUTION! Pressure correction must be used above 10 bar product pressure in the blend stream piping.

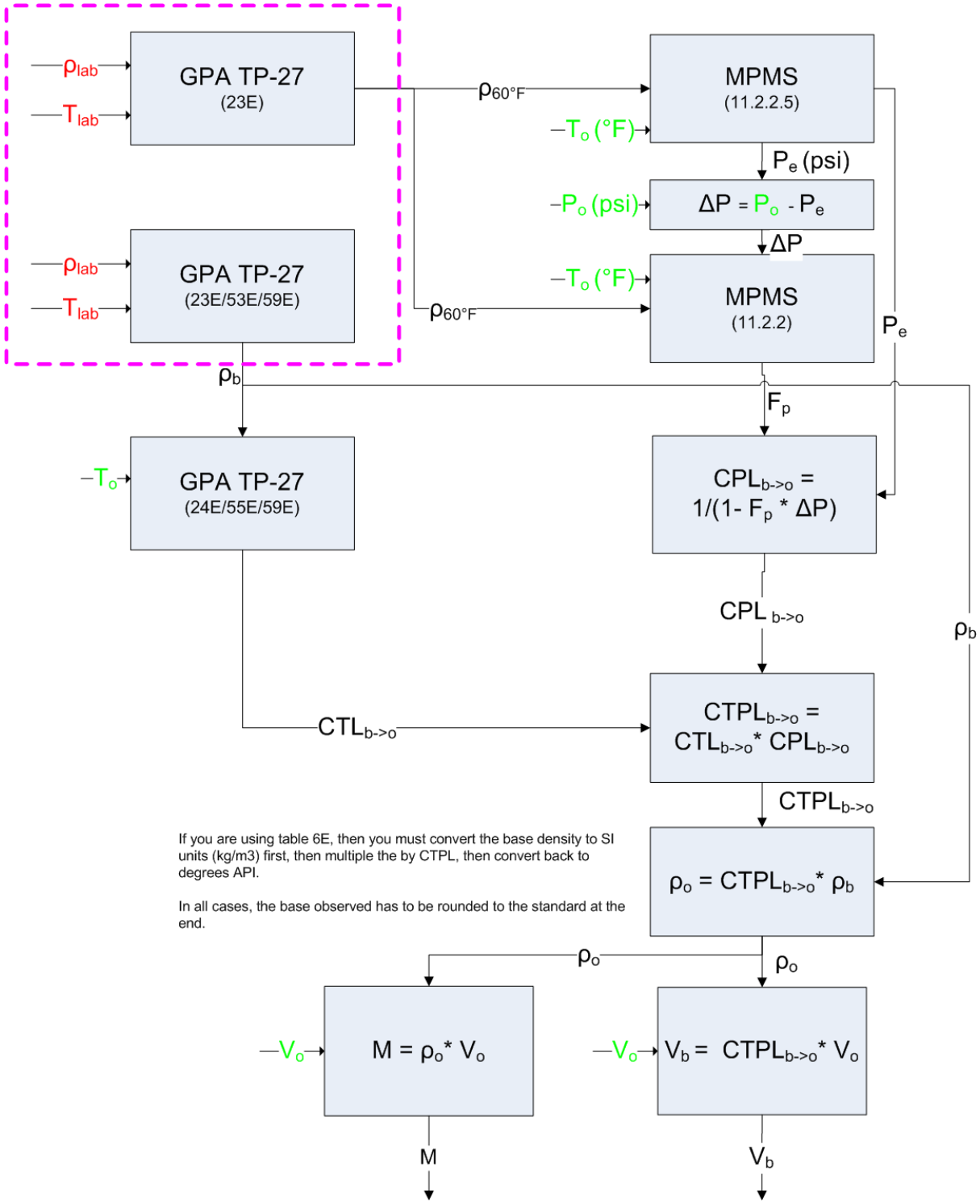


FIGURE 5-15 VCF calculations for commodity group E

5.11.7.2.4 Commodity Group FAME (Fatty Acid Methyl Esters)

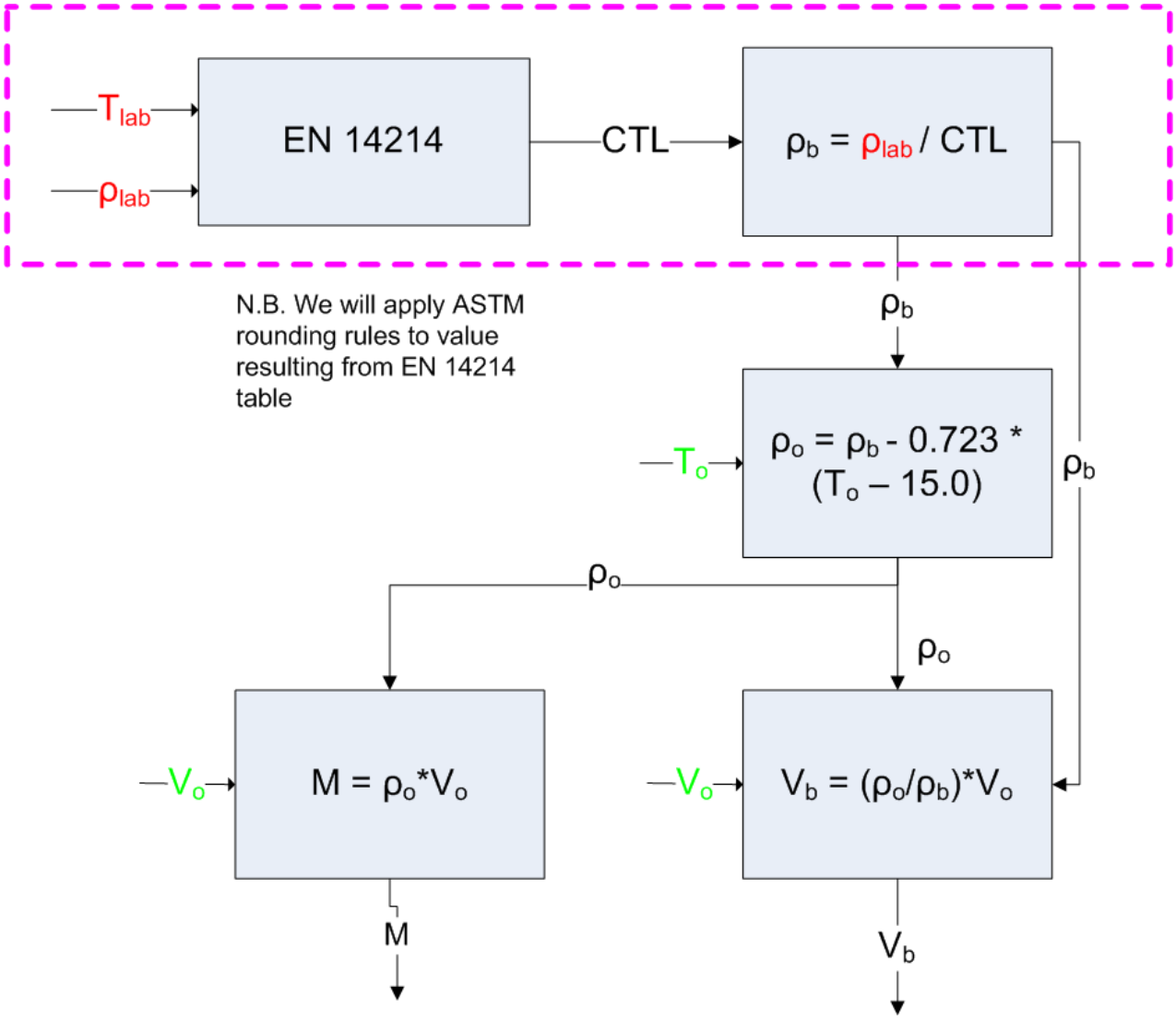


FIGURE 5-16 VCF calculations for commodity group FAME

5.11.7.2.5 Volume Correction Terms

α_{60} = expansion coefficient (for commodity group C)

ρ_{lab} = blend product density of lab sample
(`blend_product_observed_density`)

T_{lab}= blend product temperature of lab sample
(`blend_product_observed_temperature`)

T_{lab}= blend product pressure of lab sample
(`blend_product_observed_pressure`)

T_o = blend product temperature in pipe
(`instantaneous_blend_stream_temperature`)

P_o = blend product pressure in pipe
(`instantaneous_blend_stream_pressure`)

V_o = blend product volume as measured
(`transaction_blend_stream_gross_observed_volume`)

ρ_o = blend product observed density

ρ_b = blend product density at base conditions

$\rho_{60°F}$ = blend product density at 60 °F

V_b = blend product volume adjusted for base conditions
(`transaction_blend_stream_gross_standard_volume`)

M = blend product volume mass
(`transaction_blend_stream_gross_mass`)

$CTPL_{x-y}$ = temperature and pressure correction factor from conditions x to conditions y

CTL_{x-y} = temperature correction factor from conditions x to conditions y

P_e = blend product equilibrium pressure (commodity group E)

F_p= blend product compressibility factor (commodity group E)

Colors

Red = Manually measured value

Green = Real time sensor value

Black = Calculated value

Blue = Constant

(entity name)

Calculations executed only when there is a change to the lab sample values

5.11.7.2.6 Calculation of Transactional Gross Standard Volume

The calculation of the transactional Gross Standard Volume (GSV) is done incrementally by performing a volume-conversion calculation on an incremental measured blend stream volume. The volume-converted values of these incremental blend stream observed volumes are then calculated together, to generate the running accumulative transactional GSV value.

The rate at which the incremental volume conversion is done depends on the blend stream flow rate and three configuration entities. The volume conversion is done on a fixed amount of incremental volume as specified by the calculation interval volume configuration entity. However, if the elapsed time since the last volume conversion is greater than the maximum calculation time configuration entity value, then the current increment observed volume is used in the volume conversion. Similarly, the minimum calculation interval configuration entity ensures that the incremental volume conversion does not happen if the incremental observed volume reaches the calculation interval volume before the minimum calculation interval time has elapsed.

The minimum and maximum calculation interval time configuration entities ensure the following two possibilities:

- That transactional GSV displayed on the HMI is updated in a timely manner even in slow flow conditions;
- That rate of volume conversion calculation does not damage the SSC when there is a high blend stream flow rate.

Ideally the SSC should be configured such that in a high flow situation, the calculation interval volume is dispensed before the maximum calculation interval time is reached.

The transactional gross standard volume after N number of incremental calculation internals is provide by the following formula:

$$GSV_{transaction} = \sum_{i=1}^{N} VCF\,(GOV_i - GOV_{i-1})$$

Whereas GOV_i represent the total accumulative gross observed volume after i calculation intervals. GOV_0 is always 0.

A calculation interval ends if the following conditions are met:

- elapsed interval time > minimum calculation interval

AND

- (GOV_i – GOV_{i-1}) > calculation interval volume OR elapsed interval time > maximum calculation interval time.

5.11.7.3 Setup

Entity	Description	Value range
[Commodity group]	With this entity you can select the product or commodity group of the blend stream product.	<None> <Crude Oil> <Refined Prod.> (default) <Special Apps.> <Lub. Oils> <NGL & LPG> <FAME>
[Temp. compensation used]	With this entity you can enable (=<true>) or disable (=<false>) temperature correction during the calculation of GSV and mass.	<True> <False> (default)
[Press. compensation used]	With this entity you can enable (=<true>) or disable (=<false>) temperature correction during the calculation of GSV and mass. (Not applicable for FAME commodity group or special application).	<True> <False> (default)
[Base temperature]	With this entity you can select the temperature reference used to determine the base conditions of the volume correction of the GSV and mass. This base temperature must be set to a value accepted by the associated VCF table configuration entity.	default = <15.0> °C
[Base pressure]	With this entity you can select the pressure reference used to determine the base conditions of the volume correction of the GSV and mass. This base pressure must be set to a value accepted by the associated VCF table configuration entity.	default = <0.0> kPa
[VCF table]	With this entity you can select the selected VCF table.	<No Table> <1250 (2004) 5/6> <1250 (2004) 23/24> <1250 (2004) 53/54> (default) <1250 (2004) 59/60> <GPA TP-27 (07) 23/24> <GPA TP-27 (07) 53/54> <GPA TP-27 (07) 59/60> <EN 14214 (08)>

Entity	Description	Value range
[VCF Options]	With this entity you can select the options enabled when using the VCF table. The extended temperature and pressure and range give the ability to do the volume conversion over a broader range than covered by the earlier versions of the standard. For instance at locations where it is very cold, like Alaska. When <none> is selected and the application goes beyond the normal range, an error occurs.	<None> <Ext. Range> (default)

5.11.7.4 Density Data

Entity	Description	Value range
[Observed density]	With this entity you can enter the density of the blend stream product as it was measured in a lab.	default = <0.0>kg/m3
[Density temperature]	With this entity you can enter the temperature of the lab sample used to determine the blend product observed density.	default = <0.0>°C
[Density pressure]	With this entity you can enter the pressure of the lab sample used to determine the blend product observed density.	default = <0> Pa
[Derive manual status]	With this entity you can select if the manual status of the density is propagated in the status of the Gross Observed Volume or not. <Disable>: Manual status does not appear in the status of the GSV (default setting). <Enable>: Manual status appears in the status of the GSV.	<Disable> (default) <Enable>
[Glass hydrometer used]	With this entity you can specify if a glass hydrometer was used, to meter the observed blend product density. If <True>, the blend product observed density is corrected for measurement error associated with glass hydrometers.	<True> (default) <False>
[Expansion coefficient]	With this entity you can enter the expansion coefficient used during volume correction. This is only applicable for Special application commodity group.	default = <0.00000001>°C

5.11.7.5 Calculation Interval

Entity	Description	Value range
[Calculation interval vol.]	With this entity you can enter the amount of incremental GOV over which the VCF calculations are done (as long at the time since the last VCF is between the minimum and maximum calculation interval values).	<1> L ... <1000> L (default = <100.00> L)
[Min. calc. interval time]	With this entity you can enter the minimum amount of time between VCF calculations on the incremental GOV.	<1> s ... <60> s (default = <1> s)
[Max. calc. interval time]	With this entity you can enter the maximum amount of time between VCF calculations on the incremental GOV.	<1> s ... <60> s (default = <3> s)

5.11.8 Alarms

5.11.8.1 Leaking Valve

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Leaking volume limit]	With this entity you can set the maximum amount of leaking blend volume permitted. If this limit is exceeded an alarm occurs depending on [Alarm action].	<0> L ... <9999> L (default = <100.00> L)

5.11.8.2 Flush Volume

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Flush volume deviation]	With this entity you can set the maximum percentage of the [Flush volume] that is allowed to be lower than the [Flush volume] without resulting in an alarm situation (Slow flow alarm).	<0> ... <100> (default = <25> %)

5.11.8.3 No Activity

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[No activity timeout]	With this entity you can set the time in seconds in which wild stream pulses should be received if the device is permitted. When after this time no wild stream pulses has been received, an alarm occurs depending on [Alarm action].	<1> s ... <65535> s (default = <30> s)

5.11.8.4 No Pump

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Feedback timeout]	With this entity you can set the time in seconds in which the blend pump should give feedback to the SSC. If no pump feedback has been received in [Pump feedback timeout] an alarm occurs depending on [Alarm action].	<1> s ... <30> s (default = <15> s)

5.11.8.5 Deviation

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Min. volume for alarm]	With this entity you can enter the minimum volume before the SSC-B does a comparison between the actual percentage and the required percentage, to minimize false alarms when small volumes are concerned.	<1> L ... <999> L (default = <5.00> L)
[Low deviation]	With this entity you can enter the low percentage allowed before the blend percentage deviation is set. This is only evaluated at the end of the transaction with the total volumes.	<0> % ... <99> % (default = <95> %)
[High deviation]	With this entity you can enter the high percentage allowed before the blend percentage deviation is set. This is only evaluated at the end of the transaction with the total volumes.	<101> % ... <999> % (default = <105> %)

5.11.8.6 Blend Stream Closing

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Closing timeout]	With this entity you can enter the maximum time in seconds that is allowed for closing the blend valve. If the SSC-B still measures blend stream volume after this timeout period, it generates the blend valve closing alarm.	<1> s ... <240> s (default = <60> s)

5.11.8.7 Wild Stream Closing

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Closing volume limit]	With this entity you can configure the maximum wild stream volume that is allowed after the permissive is removed. If the SSC-B detects more wild stream volume, it generates wild stream closing alarm.	<1> L ... <9999> L (default = <150.00> L)

5.11.8.8 Control Fault

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Control failure timeout]	With this entity you can configure the time in seconds the SSC-B tries to correct an out-of-tolerance blend, before generating the Control failure alarm.	<1> s ... <30> s (default = <10> s)

5.11.8.9 No Hydr. Pump

Entity	Description	Value range
[Alarm action]	With this entity you can configure the alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Feedback timeout]	With this entity you can enter the time in seconds in which the hydraulic pressure pump should give geedback to the SSC. If no pump feedback has been received in [Pump feedback timeout], an alarm occurs depending on [Alarm action].	<1> s ... <30> s (default = <15> s)

5.11.8.10 Fixed

Entity	Description	Value range
[Pulse phase]	With this entity you can configure the [Pulse phase] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Pulse hardware]	With this entity you can configure the [Pulse hardware] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Factored pulse out]	With this entity you can configure the [Factored pulse out] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Volume correction]	With this entity you can configure the [Volume correction] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)

Entity	Description	Value range
[Temperature sensor]	With this entity you can configure the [Temperature sensor] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Pressure sensor]	With this entity you can configure the [Pressure sensor] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Block valve fault]	With this entity you can configure the [Block valve fault] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
[Tank low level]	With this entity you can configure the [Tank low level] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> (default) <Display shutdown>

Entity	Description	Value range
[Tank empty]	With this entity you can configure the [Tank empty] alarm behaviour in case this particular alarm occurs. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)
Service due expired	With this entity you can configure the [Service due expired] alarm behaviour in case this particular alarm occurs. The [Next scheduled service] entity is configured with the date when the next service activities should take place for the SSC-B. <Disabled>:The alarm is ignored. <Display>:Alarm shown on the display Alarm-indication output set to ON <Display shutdown>: Alarm shown on the display Alarm-indication output set to ON Alarm-shutdown output set to ON Running transactions are stopped Start-up of new transactions impossible	<Disabled> <Display> <Display shutdown> (default)

5.12 Calibration

5.12.1 Why Calibrate?

A flow meter gives a number of pulses per amount of fuel that passes through the meter. The *number of pulses per volume unit* this meter gives is called its *K-factor*. By the manufacturer, this K-factor is exactly specified per delivered flow meter.

To increase the accuracy of the flow meter, a calibration can be performed. This is done by comparing the actual resulting fuel volume received in a calibrated vessel (see FIGURE 5-17) with the displayed value on the SSC-B screen, being the result of the value returned from the flow meter.

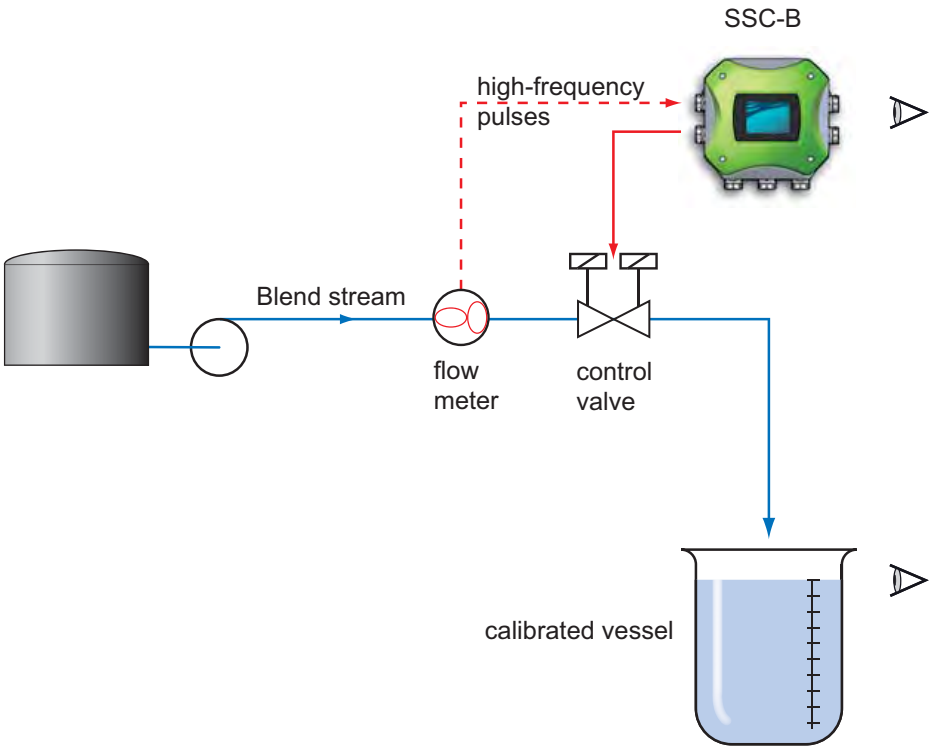


FIGURE 5-17 Calibrating the flow meter

With these 2 values a correction factor can be calculated, which then is used to (re-)calibrate the flow meter.

This correction factor is called the meter factor.

The resulting blending volume (V) is then:

V = number of pulses / (K-factor * meter factor).

5.12.2 Calibration Menu Choice

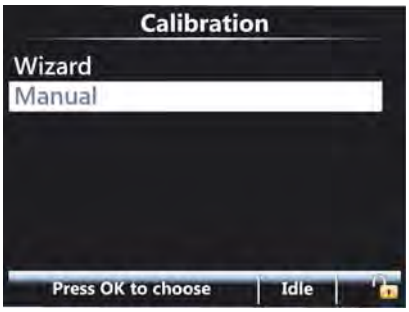
From the Main Menu > Calibration menu, you can select either the **Wizard** or the **Manual** calibration method (see second screen).

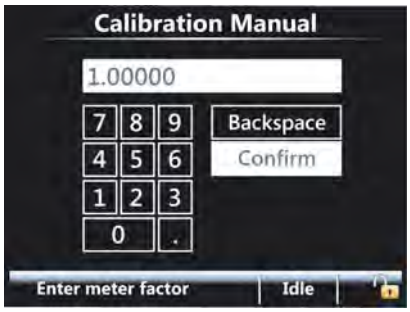
5.12.3 Manual Calibration

➔ From the Calibration menu, choose Manual and select <OK>

➔ Enter meter factor and confirm

➔ Select <OK>





5.12.4 Calibrating Using the Calibration Wizard

The built-in calibration wizard makes it easy to (re-)calibrate the flow meter, by executing the following steps through the SSC-B menu:

CAUTION

CAUTION! Ensure the desired calibration flow conditions are configured at Configuration > Control Settings > Calibration (see 5.11.5.3).

➔ Enter volume to be injected

➔ Measure actual volume result (calibrated vessel)

➔ Enter this result

New meter factor is displayed now.

➔ Accept new meter factor

■ Flow meter is (re-)calibrated

In the following, this process is explained in detail.

WARNING! Do all necessary preparations (calibrated vessel in place, and so on), before starting the actual calibration!

■ A sequence of input screens is used to calibrate the blend meter factor

➔ Step 1: Enter amount to dispense

➔ Step 2: Press start and wait for blend volume to be dispensed (progress bar)

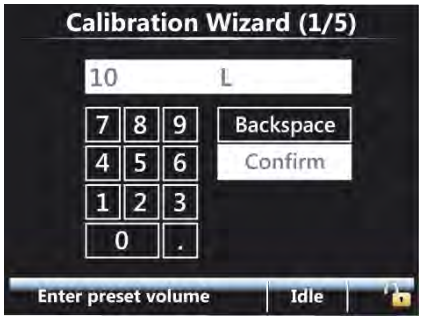
➔ Step 3: Enter measured volume

➔ Step 4: Confirm new blend meter factor

■ Each calibration is saved in non-volatile memory with date, time, old, and new values

➔ Enter preset volume

Enter here the volume the SSC-B must blend for the calibration process.



■ Calibration starting...

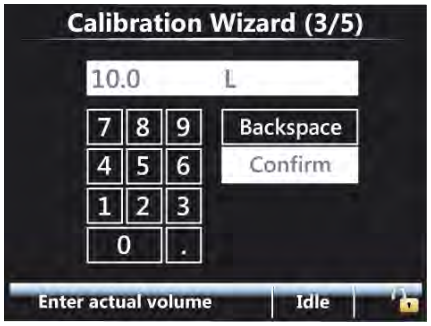
As soon as you enter <OK>, the calibration process starts.

The screen shows the progress of the blending process, by displaying a progress bar.

■ Blending in progress

➔ Enter the actual measured volume (calibrated vessel).

With this entered value and the value the SSC-B measured, a new meter factor is calculated.



The new meter factor is displayed.

➔ Select <OK> to accept new meter factor.

or

➔ Select <ESC> to reject new meter factor.

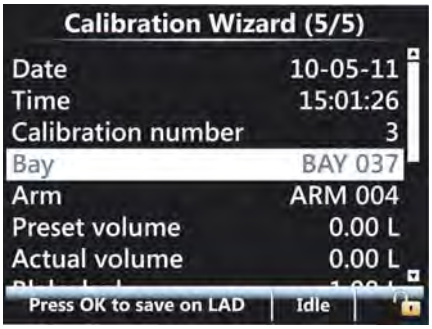
NOTE: In case <ESC> is selected, the old meter factor is restored.

- Calibration process overview

A new calibration record is created and stored into the system.

An overview of the calibration process is shown here.

➔ Select <OK> to exit to the Main Menu

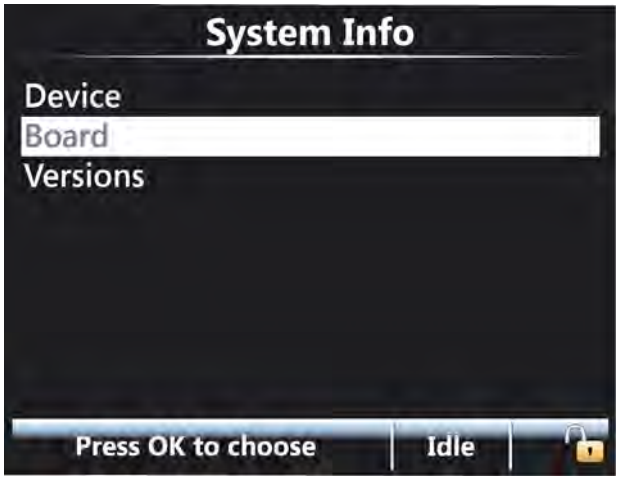


5.13 Info (Information of the device)

- The SSC “About” box is showing important information about:
  - FlexConn protocol
  - FlexConn build
  - Application firmware build
  - Device serial number
  - Board serial number
  - Bootloader firmware version

In this screen identification information is shown of the following device components:

- Serial number of each FlexConn board
- Hardware version of each FlexConn board
- Application firmware version of each FlexConn board
- Build information of the firmware of each FlexConn board
- FlexConn stack firmware version of each FlexConn board
- Build information of the FlexConn stack firmware of each FlexConn board

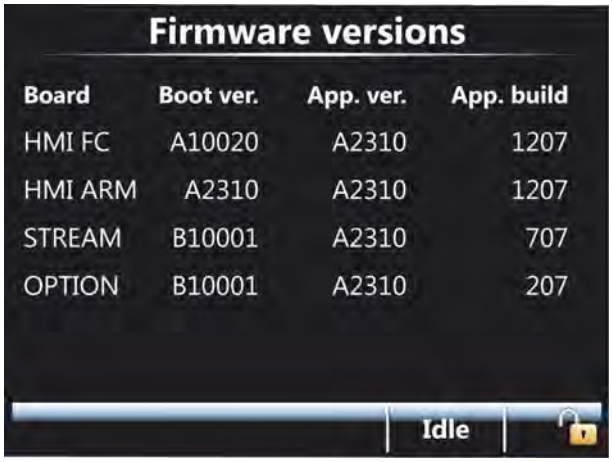


- Select <Device> in the System Info screen and then select <OK>.

  The Device Info screen appears.

- Select <Versions> in the System Info screen and then select <OK>.

  The Firmware versions screen appears.



- Select <Board> in the System Info screen and then select <OK>.

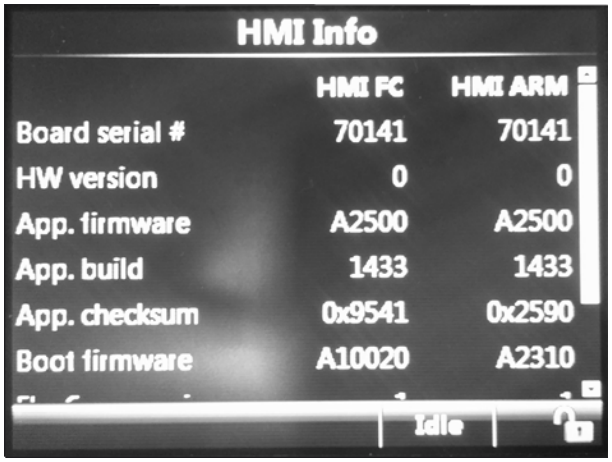
  The Board Info screen appears.

  Select the relevant board, which provides an overview of the particular board, such as serial number, hardware version, and software-related version numbers.

- Select <HMI> in the Board Info screen and then select <OK>.

  The HMI Info screen appears with the following details.

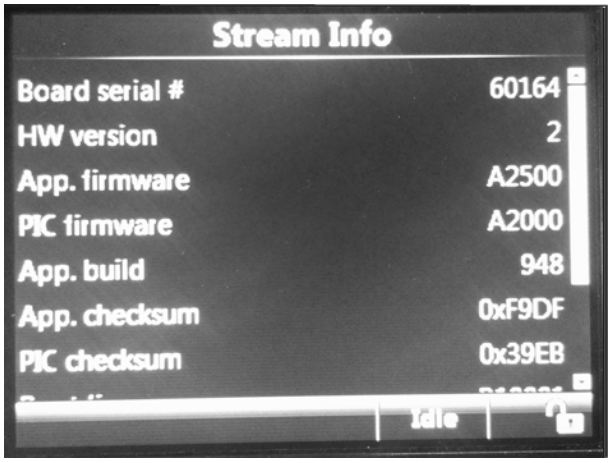
  - Board serial #
  - HW version
  - App. firmware
  - App. build
  - App. checksum
  - Boot firmware
  - FlexConn version
  - FlexConn build



- Select <Stream> in the Board Info screen and then select <OK>.

  The Stream Info screen appears with the following details.

  - Board serial #
  - HW version
  - App. firmware
  - PIC firmware
  - App. build
  - App. checksum
  - PIC checksum
  - Boot firmware
  - FlexConn version
  - FlexConn build

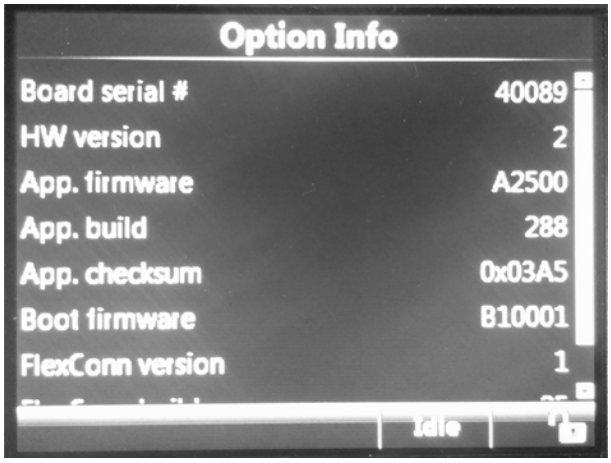


- Select <Option> in the Board Info screen and then select <OK>.

  The Option Info screen appears with the following details.

  Board serial #

- HW version
- App. firmware
- App. build
- App. checksum
- Boot firmware
- FlexConn version
- FlexConn build

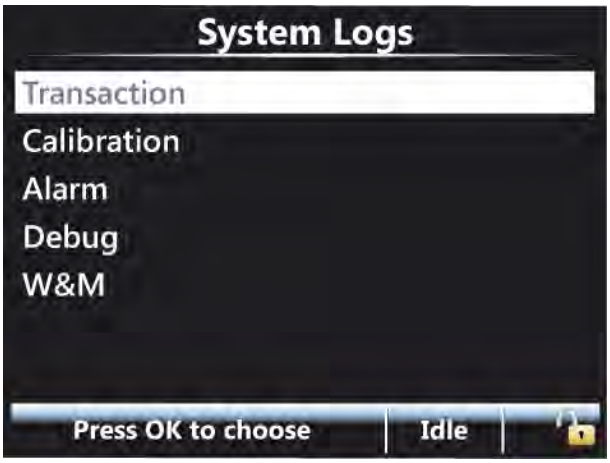


5.14 Logs

- This is the user interface to various logs maintained in non-volatile memory including:
  - Transaction log: complete information for each transaction
  - Calibration log: shows the sequence of blend meter factor calibrations over time
  - Alarm Log: a chronological list on when alarms occurred and what type of alarms they were
  - Debug Log: a list of device events that can be retrieved for fault finding purposes
  - W&M Log: shows the software W&M seal events

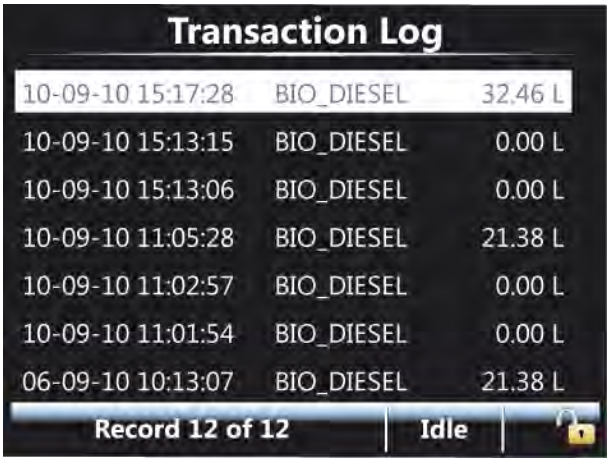
- In this screen, the following data logs can be viewed:
  - all available transaction records
  - all available calibration records

- all available alarm records



5.14.1 Transaction Log

■ Select <OK> for <Transaction>, the Transaction log appears.



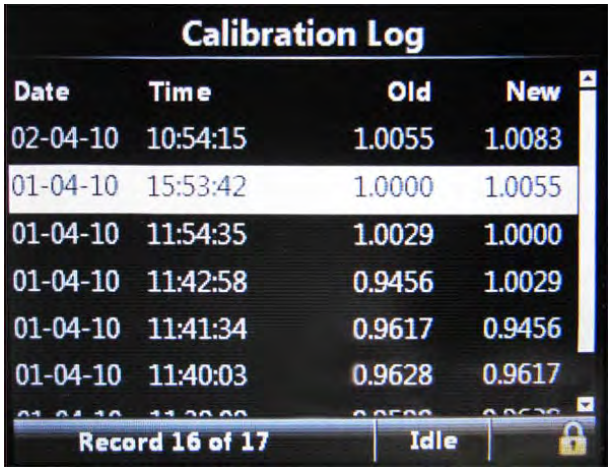
■ Select <OK> for one specific transaction from the Transaction log list. The Transaction info is displayed.

- Load number
- Transaction ID
- Transaction start
- Transaction stop
- Arm name
- Calibration number
- Product name
- Additive name

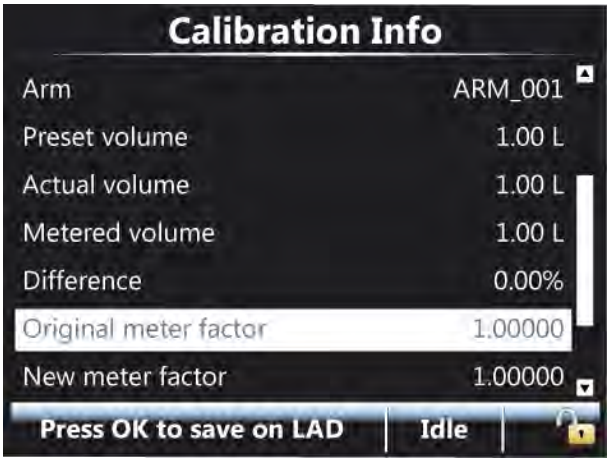
- ppm
- Load volume
- Critical error
- Non critical error
- Additive vol per inj.
- Additive deviation
- Vol per inj. cycle
- Batch start acc. GOV
- Batch stop acc. GOV
- Batch additive GOV
- Haz. mat. class.
- Bay name
- Site name
- Device type
- Trans. record version

5.14.2 Calibration Log

■ Select <OK> for <Calibration> from the System logs menu, the Calibration log appears.

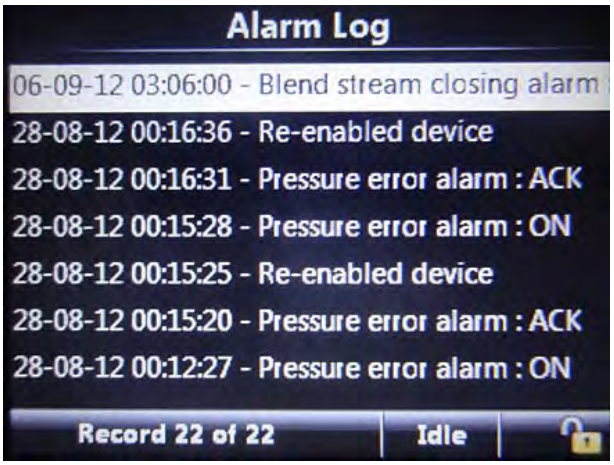


- Select <OK> for one specific calibration log from the Calibration log list. The Calibration log appears.
  - Date
  - Time
  - Calibration number
  - Bay
  - Arm
  - Preset volume
  - Actual volume
  - Metered volume
  - Difference
  - Original meter factor
  - New meter factor
  - Quad pulse serial #
  - RTD serial #
  - AI serial #



5.14.3 Alarm Log

- Select <OK> for <Alarm> from the System logs menu, the Alarm log appears.



5.14.4 W&M Log

The W&M log contains the “software W&M sealing” activities.

These logs are identified by a Person and the Sealing date and time.

- Select <OK> for <W&M> from the System logs menu, the W&M log appears.

- Select a W&M log. The following information appears.

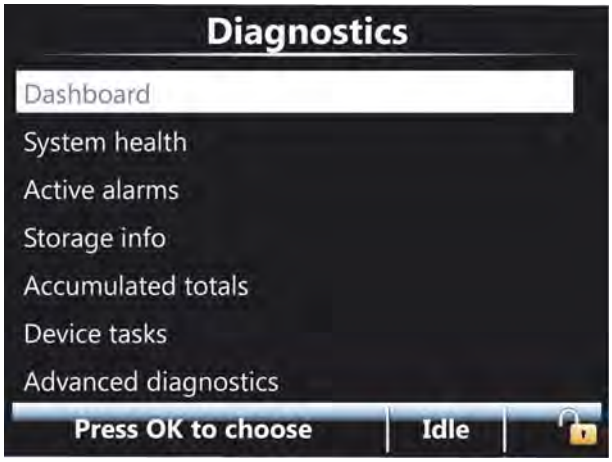
5.15 Diagnostics

This menu provides the following features:

- High-level view of the current state of all device I/O functions.
- Digital inputs/outputs show state as “High”/ “Low”.
- The values of all output channels (digital and analog) can be set explicitely. Outputs can be operated manually to activate, control, and test field equipment. This is extremely useful for commissioning tests.
- Internal memory usage overview.
- System health overview.
- Active alarms overview.

In this screen, you can view the diagnostics about the following subjects:

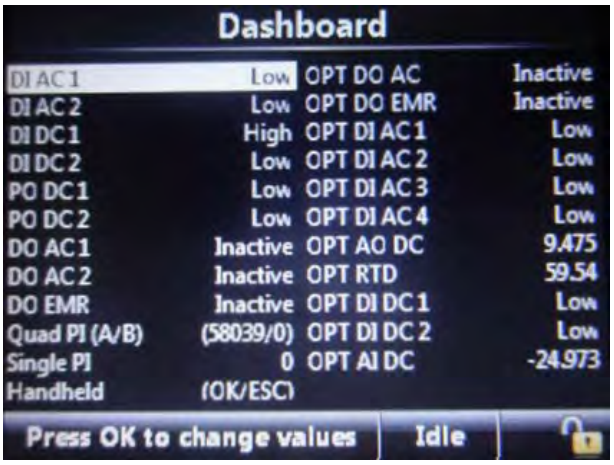
- Dashboard - Overview of all I/O (Dashboard).
- System health - Overview of system health.
- Active alarms - Overview of all active alarms.
- Storage info - Overview of available memory space for data logs and total number of available logs.
- Accumulated totals - Total volume of the blend stream and wild stream since last *Clear totals* command.
- Device tasks
  - Reset task - possibility to reset:
    - total device
    - to factory default settings
  - Comms task; possibility to simulate actions by Comms
  - Clear task:
    - clear all alarms
    - clear all totals
    - clear wild stream totals only
    - clear blend stream totals only
- Advanced diagnostics
  - Flow rates
  - Deviation graph
  - Process overview



5.15.1 Dashboard

The I/O Dashboard displays the state or value of all available I/O blocks in the SSC-B.

Select each output function to test and activate it.



To change the value from **Inactive** to **Active** or vice versa for an output function (DO, DO EMR, AO, or PO), select the function and then select <OK>.

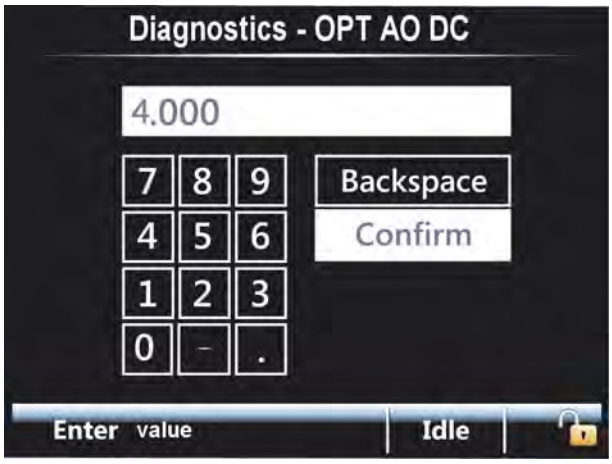
To change the value from **Low** to **High** for input functions (DI or PI), wire a DO to a DI in order to change the DI value from Low to High or vice versa.

When an output function is activated by the I/O Dashboard, ensure that the output is not "bound" (I/O binding) to a certain function. In some situations the firmware takes over the control of that particular output.

To enter the value of AO, perform the following steps.

1. Select <Diagnostics> from the Main Menu.
2. Select Dashboard.
3. Select OPT AO DC function in the Dashboard.

   The Diagnostics - OPT AO DC screen appears.



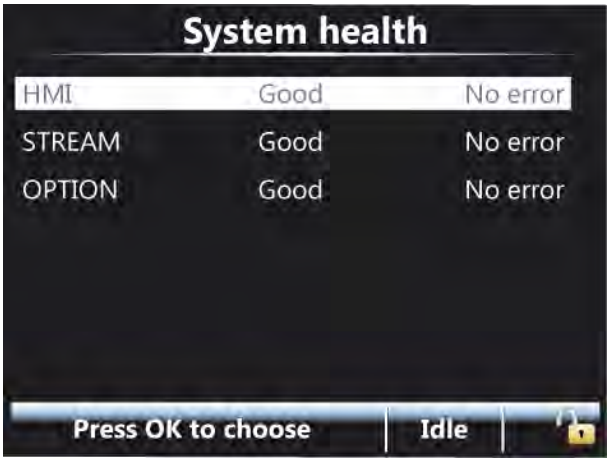
4. Enter the value for AO and then select Backspace or Confirm.

   The default value is 4.000.

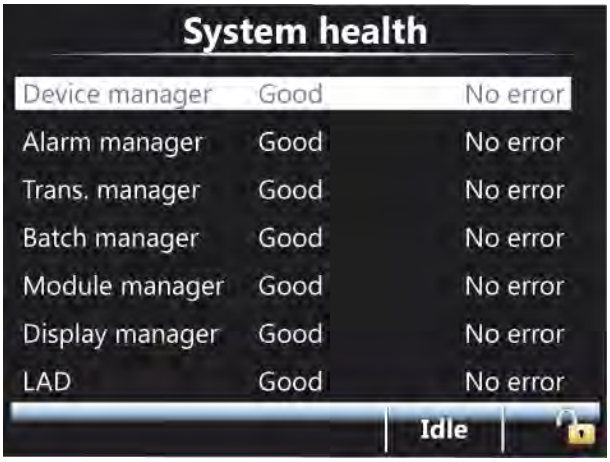
NOTE: Ensure that you unbind the I/O when forcing the outputs to avoid unpredictable control errors.

5.15.2 System Health

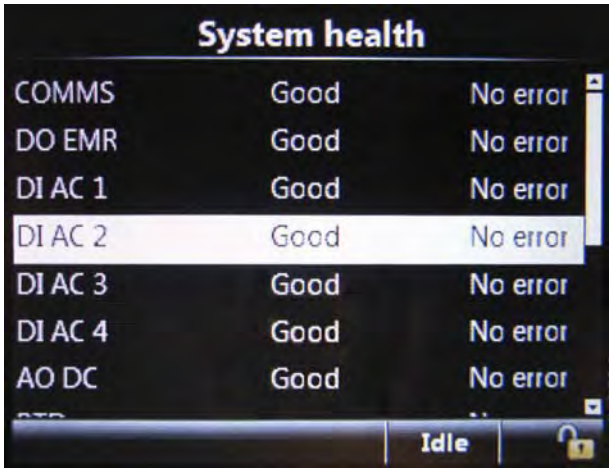
- Select <System health> to display the health of the system. The following screen appears.



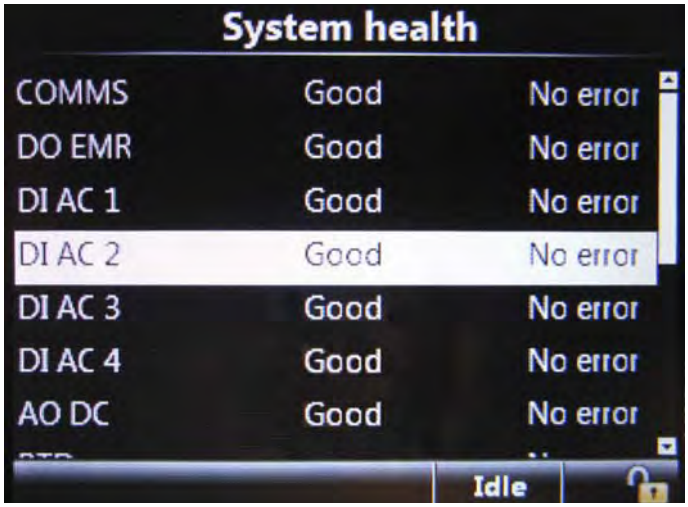
- Select <HMI> to view the details of HMI board. The following screen appears.



- Select <STREAM> to view following details of the STREAM board.
  - COMMS
  - DI AC 2
  - DI DC 1
  - DI DC 2
  - DO AC 1
  - DO AC 2
  - PO DC 1
  - PO DC 2
  - Pulse input
  - DI AC 1
  - DO EMR
  - Blend manager
  - Additive manager
  - Module manager

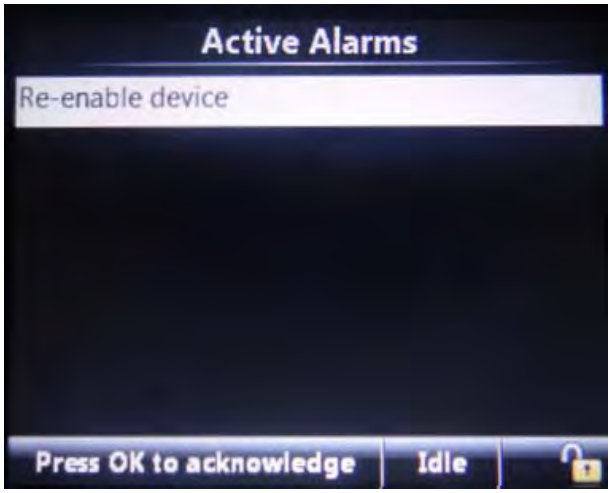


- Select <OPTION> to view following details of the OPTION board.
  - COMMS
  - DO EMR
  - DI AC 1
  - DI AC 2
  - DI AC 3
  - DI AC 4
  - AO DC
  - RTD
  - DO AC
  - DI DC 1
  - DI DC 2
  - Module manager
  - AI DC



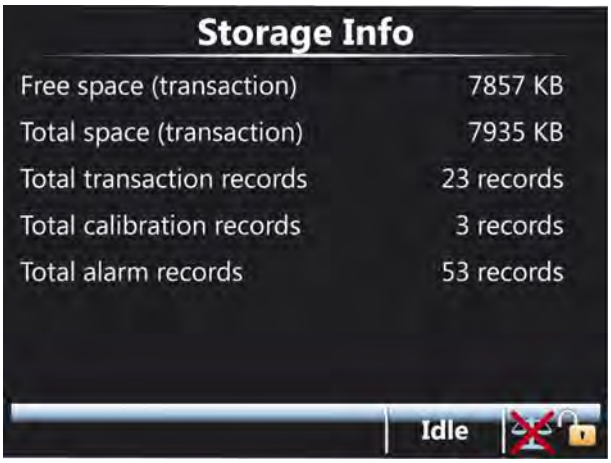
5.15.3 Active Alarms

- Select <Active alarms> from the Diagnostics main menu, an overview of all active alarms appears.



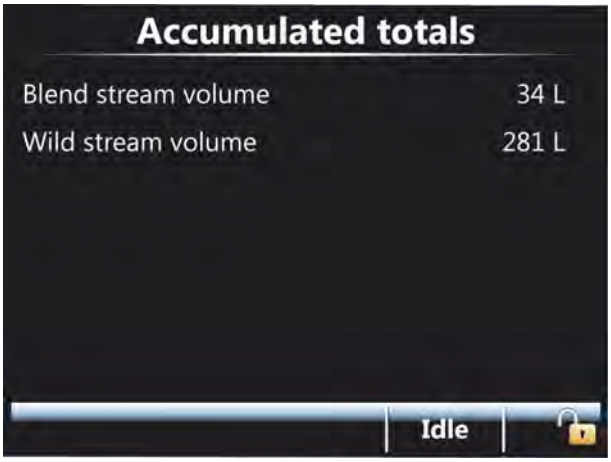
5.15.4 Storage Info

- Select <Storage info>, from the Diagnostics main menu, an overview of actual stored logs appears.



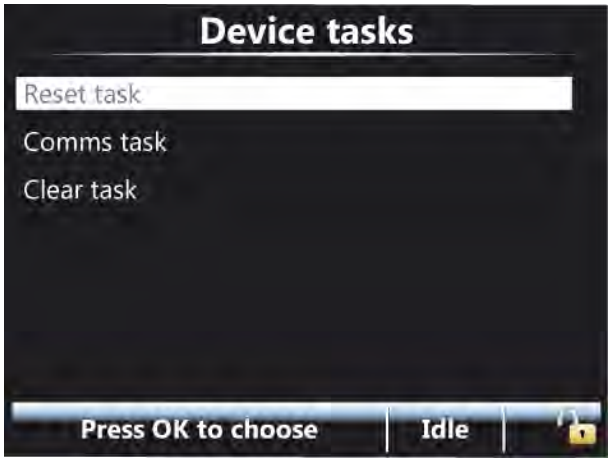
5.15.5 Accumulated Totals

- Select <Accumulated totals> from the Diagnostics main menu, an overview of accumulated totals appears.



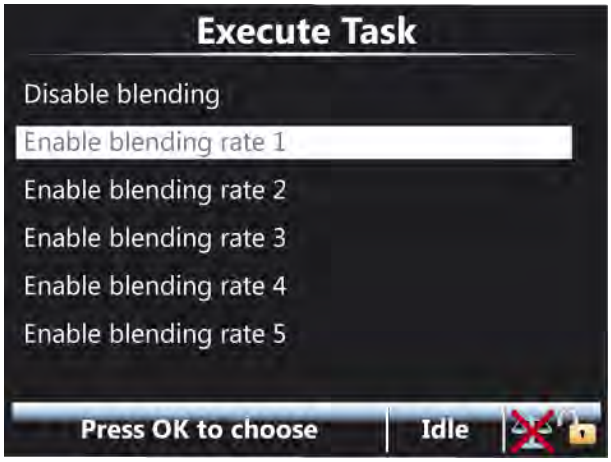
5.15.6 Device Tasks

- Select <Device tasks> from the Diagnostics main menu, the <Device tasks> submenu appears.

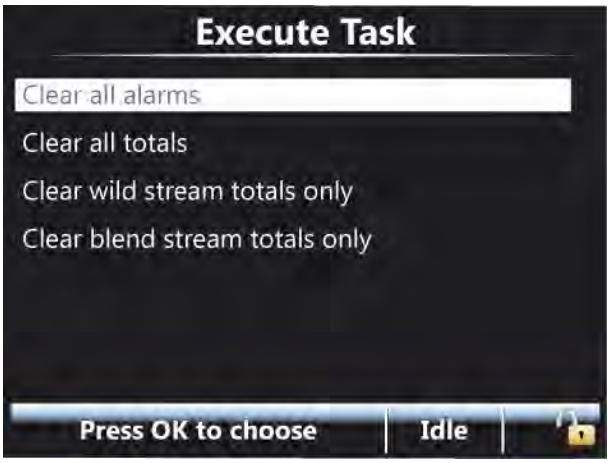


- Select <Reset task>. The following screen appears.

- Select <Comms task>. The following screen appears.

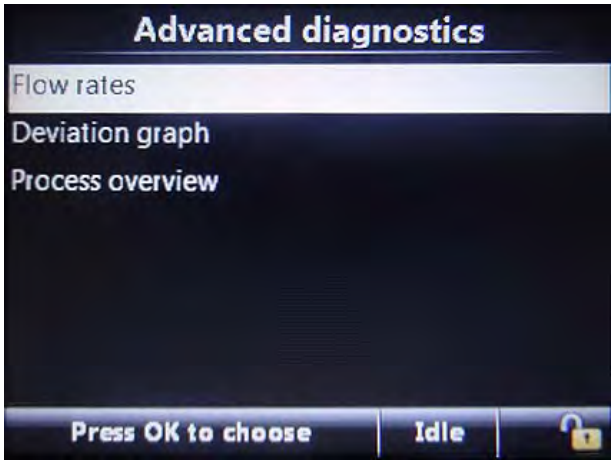


- Select <Clear task>. The following screen appears.



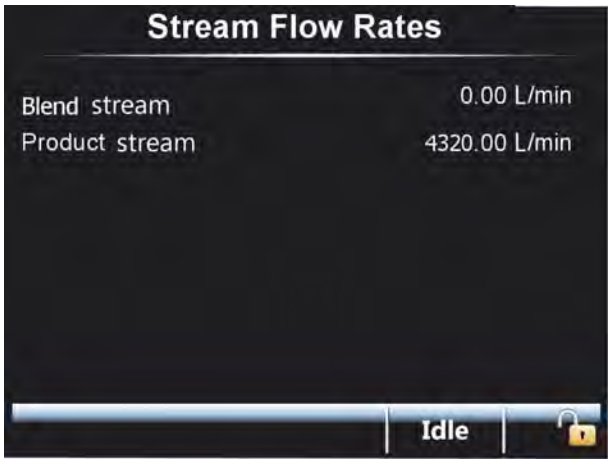
5.15.7 Advanced Diagnostics

- Select <Advanced diagnostics> from the Diagnostics main menu, the <Advanced diagnostics> submenu appears.



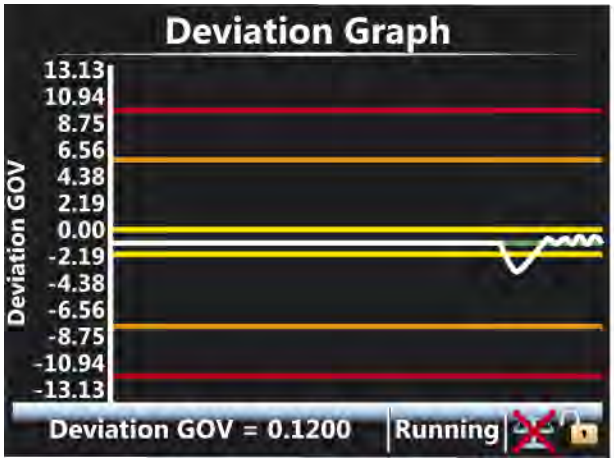
5.15.7.1 Flow rates

- Select <Flow rates> from the Diagnostics main menu, the <Stream Flow Rates> submenu appears.



5.15.7.2 Deviation Graph

- Select <Deviation graph>, the following screen appears.



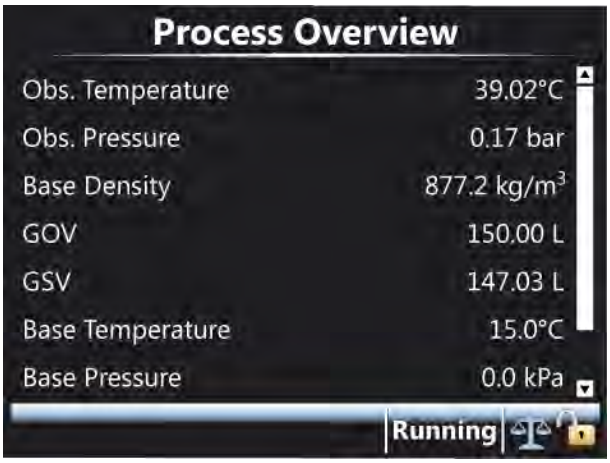
The horizontal lines drawn on this graph represent the control window boundaries.

Red = Outer window
Orange = Middle window
Yellow = Inner window
Green = Dead band

Use the ^ LAD key to zoom in
Use the v LAD key to zoom out

5.15.7.3 Process Overview

- Select <Process overview>, the following screen appears.

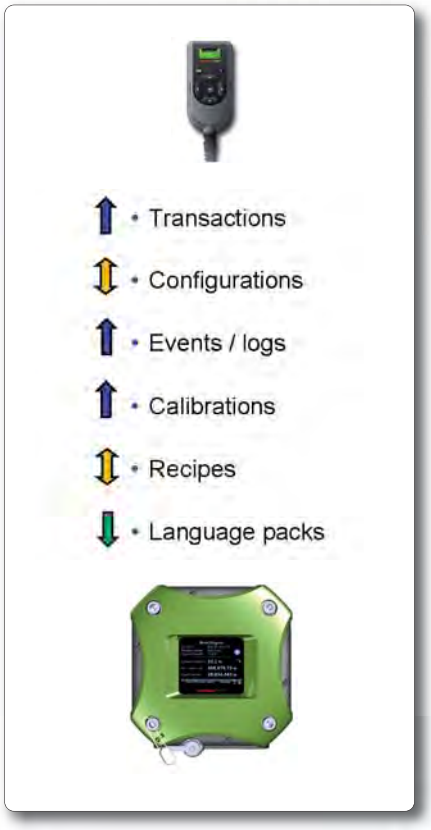


5.16 Transfer

5.16.1 General

In this menu option, various data sets can be transferred between the SSC-B and the LAD; see the following screen.

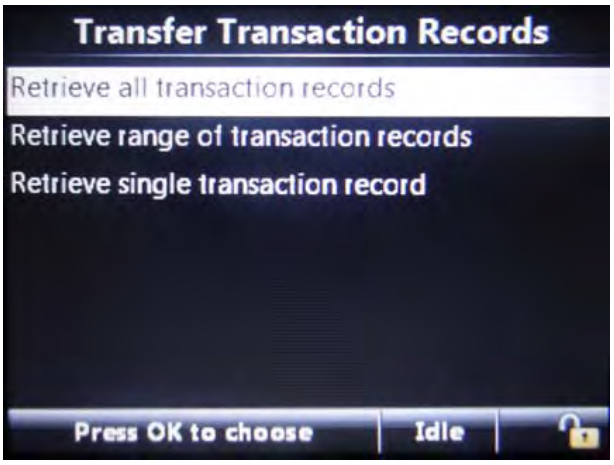
The data-transfer directions are defined as follows.



5.16.2 Retrieving Transaction Records

The SSC-B provides an interface to read transaction records through FlexConn entities. These entities are used to transfer transactional data to the Fusion4 Portal through a serial link.

- Select <Transaction records> from the Transfer main menu, the following screen appears.



- Retrieving All Transaction Records

Using the LAD or Fusion4 Portal, all archived transaction records can be retrieved. The definition of these records extends the definition used by communication.

Each transaction record includes: start date, start time, product volume, blend volume, alarms, percent deviation, and end time.

These parameters are “read only”, meaning they cannot be changed by you.

For an explanation of all transaction record parameters, see 5.16.3 - Blend Transaction Record Explained.

NOTE: The <Retrieve single transaction record> command cannot be used through Fusion4 Portal. This screen is only used by copying a transaction record to the LAD.

NOTE: All transactions are overwritten and the transaction cannot be retrieved through the Fusion4 Portal or the LAD. The user must have settled all transactions before the oldest one is automatically deleted and overwritten. Maximum 10.000 un-settled transactions can reside in the transaction memory of the SSC-B.

5.16.3 Blend Transaction Record Explained

5.16.3.1 Transaction Record Parameters

Transaction record parameter	Description
[arm_name]	The name of ARM used to dispense the blended product
[base_pressure]	Reference pressure that you define for volume correction
[base_temperature]	Reference temperature that you define for volume correction
[batch_actual_blend_percentage]	The actually blend percentage of the final product
[batch_gross_mass]	The total gross mass of the blend product dispensed during the batch
[batch_gross_observed_volume]	The total observed volume of blend stream product dispensed during the batch
[batch_gross_standard_volume]	The total gross standard volume of blend stream product dispensed during the batch
[batch_ID]	The batch ID associated with the following batch record
[batch_recipe_definition]	The blend recipe used during the batch (name, blend %, API symbol)
[batch_start_accumulated_gross_observed_volume]	The gross accumulated volume at the start of the batch
[batch_start_accumulated_gross_standard_volume]	The net accumulated volume at the start of the batch NOTE: The *Gross Standard Volume* is sometimes referred as either *Net Volume* or *Alternate Volume*.
[batch_stop_accumulated_gross_observed_volume]	The gross accumulated volume at the end of the batch
[batch_stop_accumulated_gross_standard_volume]	The net accumulated volume at the end of the batch
[bay_name]	The name of the bay at which the transaction happened
[blend_point]	Specifies where the blend point was - upstream or downstream
[blend_stream_average_pressure]	The average blend stream pressure during the transaction
[blend_stream_average_temperature]	The average blend stream temperature during the transaction
[calibration_number]	A counter incremented each time flow meter calibration is done
[commodity_group]	The commodity group of the blend product
[device_id]	A user-specified identifier for the unit
[device_type]	This describes the type of Fusion4 device the transaction record comes from
[expansion_coefficient]	The expansion factor used for commodity group C (special application)
[hazardous_material_classification]	A string that describes the hazardous material classification of the resulting product

Transaction record parameter	Description
[hydrometer_correction_used]	Indication whether a hydrometer correction was applied to the observed product density
[load_number]	An optional number supplied by TAS when the blender is used with loader
[non_W&M_error]	An error condition associated with the transaction that does not break W&M compliance
[observed_density]	The observed product density used to do density compensation
[observed_pressure]	Pressure at which the product density measurement was done
[observed_temperature]	Temperature at which the product density measurement was done
[preset_volume]	When used with a preset, this value defines the preset volume amount. If not used in a preset mode, this value should be 0.
[pressure_compensation_used]	Expresses whether pressure compensation was used to calculate the gross standard volume
[site_name]	The name of the site where the transaction happened
[temperature_compensation_used]	Expresses whether temperature was used to calculate the gross standard volume
[transaction_record_integrity_value]	160-bit digest value generated from SHA-1 hash function
[transaction_record_version]	The version of this transaction record
[transaction_start_date]	The date when the transaction began (sampled from RTC entity)
[transaction_start_time]	The time at which the transaction began (sampled from RTC entity)
[transaction_status]	Whether the device was W&M-compliant during the whole transaction
[transaction_stop_date]	The date when the transaction ended (sampled from RTC entity)
[transaction_stop_time]	The time at which the transaction ended (sampled from RTC entity)
[transaction_unique_identifier]	A string that uniquely identifies the transaction from all other transactions for all Fusion4 devices
[units_of_density]	The engineering units associated with all density measurements in this record
[units_of_mass]	The engineering units associated with all mass measurements in this record
[units_of_pressure]	The engineering units associated with all pressure measurements in this record
[units_of_temperature]	The engineering units associated with all temperature measurements in this record
[units_of_volume]	The engineering units associated with all volume measurements in this record

Transaction record parameter	Description
[volume_correction_table]	An enumeration that specifically identifies the volume correction method use during the transaction
[W&M_error]	An error condition associated with the transaction that breaks W&M compliance
[wild_stream_total_transaction_volume]	The total wild stream volume moved during the transaction

5.16.3.2 Transaction Alarm Codes

On the BOL (Bill of Lading) document, an alarm message is denoted as an alarm code. In the following tables, these alarm codes are explained.

REMARK: For an overview of all critical and non-critical alarms, see also *Chapter 6 - Alarm Handling*.

5.16.3.2.1 W&M Related Alarm Codes

Alarm code	Description
1	ALARM_GENERAL_FAIL
2	ALARM_POWER_FAILURE
50	HMI_ALARM_NO_COMMUNICATION
51	HMI_ALARM_FATAL_ERROR
52	HMI_ALARM_STREAM_BOARD_FAILURE
53	HMI_ALARM_OPTION_BOARD_FAILURE
54	HMI_ALARM_LICENSE_FAILURE
55	HMI_ALARM_BATCH_PERMISSIVE
100	STREAM_ALARM_CONTROL_FAILURE
103	STREAM_ALARM_STREAM_START_ERROR
104	STREAM_ALARM_PULSE_PHASE
105	STREAM_ALARM_PULSE_GENERAL
200	STREAM_ALARM_VCF_ERROR
201	STREAM_ALARM_TEMPERATURE_ERROR
202	STREAM_ALARM_PRESSURE_ERROR

5.16.3.2.2 Non-W&M Related Alarm Codes

Alarm code	Description
56	HMI_ALARM_SERVICE_DUE_REMINDER
101	STREAM_ALARM_NO_ACTIVITY_TIMEOUT
102	STREAM_ALARM_SOLENOID_FAILING
106	STREAM_ALARM_LEAKING_STREAM_VALVE
107	STREAM_ALARM_SLOW_FLOW_VOLUME
108	STREAM_ALARM_NO_PUMP_SENSE
109	STREAM_ALARM_BLOCK_VALVE_FAILING
110	STREAM_ALARM_FACTORED_PULSE_OUT
111	STREAM_ALARM_NO_HYDRAULIC_PRESSURE
112	STREAM_ALARM_TANK_LOW_LEVEL
113	STREAM_ALARM_TANK_EMPTY
203	STREAM_ALARM_STREAM_PERCENTAGE
204	STREAM_ALARM_WILD_STREAM_CLOSING_VOL
205	STREAM_ALARM_BLEND_STREAM_CLOSING_TIMEOUT

5.16.4 Configurations

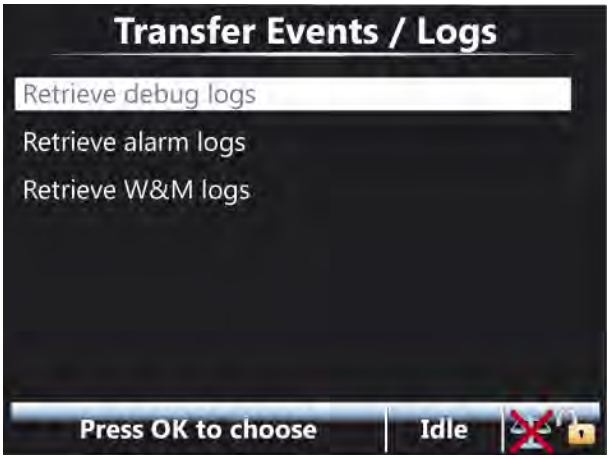
- Select <Configurations> from the Transfer main menu, the following screen appears.

- <Apply configuration> - Select <Apply configuration> to install the configuration present on the SD card.
- <Retrieve configuration> - Select <Retrieve configuration> to save the current configuration on the SD card.
  - Enter the name of the file you want to create on the SD card for the configuration setup and select Confirm.

    The process takes approximately 1 minute to complete.

5.16.5 Events / Logs

- Select <Events / Logs> from the Transfer main menu, the following screen appears.



- In the <Events / Logs> submenu, 3 types of logs can be retrieved from the SSC-B:
  - debug logs = advanced technology diagnostics;
  - alarm logs = historian of enabled device alarms;
  - W&M logs = software sealing activities of the SSC-B, performed by a notified body or accredited service engineer.

5.16.6 Recipes

- Select <Recipes> from the Transfer main menu, the following screen appears.

- <Install recipe> installs a recipe present on the SD card.
- <Retrieve recipes> saves the current recipes to the SD card.

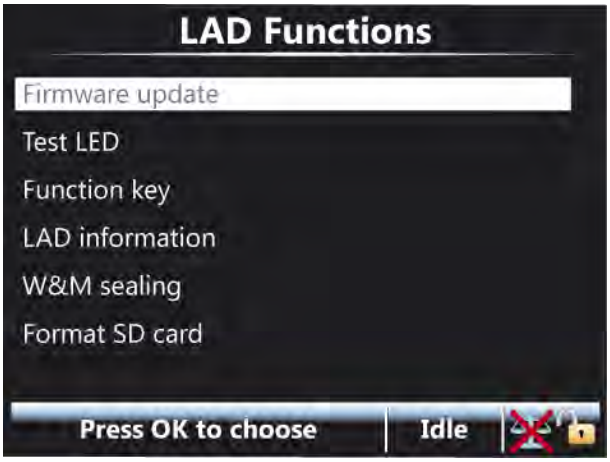
5.16.7 Language Packs

- Select <Language packs> from the Transfer main menu, the following screen appears.

5.17 LAD Functions

5.17.1 General

In this menu option, several typical LAD functions and activities can be invoked.



5.17.2 Firmware Upgrade

NOTE: Remove the old files that are available in this folder from previous upgrades before updating the files.

Perform the following steps to upgrade the device using the LAD.

1. Replace the following updated firmware files received in the **\Honeywell\SSC-B\Generic\Firmware** directory.
   - FS-HMI-ARM-APP_DSP_.bin
   - FS-HMI-FC-APP.mhx
   - FS-STREAM-FC-APP.mhx
   - FS-OPTION-FC-APP.mhx (Optional)

NOTE: FS-OPTION-FC-APP.mhx file is only required if the Option card is installed in the device.

2. Plug-in the LAD to the SSC and make sure the SD card is in the LAD before plugging the LAD.

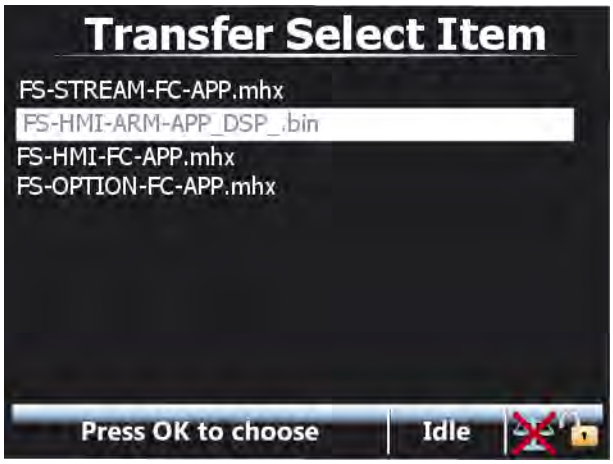
   A green status light on the LAD indicates that the SD card is inserted correctly and a red status light indicates that the SD card is missing.

NOTE:

Update the firmware only when the device is not being used.
Do not insert or remove the SD card when the LAD is connected to the device and do not remove the LAD when an upgrade file is downloading.
Do not perform the update procedure when there is a chance of a power outage as this can cause problems and/or make the device unusable.

3. Select <Firmware update> to either update the firmware of the SSC boards or the LAD firmware itself.

4. Select <Fusion4 device>. The Transfer Select Item screen appears.



Select the firmware files in the following order to update the files.

1.FS-HMI-ARM-APP_DSP_.bin

- The total time for the firmware update file is 6 minutes approximately.
- After the file is updated, remove and plug the LAD again to re-initialize it. If you do not plug the LAD again, then the device may not recognize the SD card when the next file is downloaded.

2.FS-HMI-FC-APP.mhx

- The total time for the firmware update file is 3 minutes approximately.
- After the file is updated, remove and plug the LAD again to re-initialize it. If you do not plug the LAD again, then the device may not recognize the SD card when the next file is downloaded.

3.FS-STREAM-FC-APP.mhx

- The total time for the firmware update file is 9 minutes approximately.
- After the file is updated, acknowledge and reset the alarm by performing the following steps.

  1.Select <Active alarms> from the Diagnostics main menu.

  2.Select <Reset Device> to reset the device.

3.FS-OPTION-FC-APP.mhx (if required)

- The total time for the firmware update file is 6 minutes approximately.
- Update the file only if it is available.

Once the firmware updation is successful, a message is displayed confirming the same.

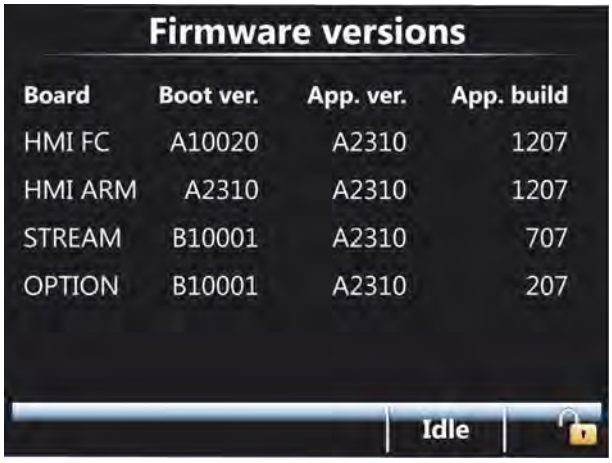
If you see an alarm "Stream board missing" when updating the stream board firmware or "Option board missing" when updating the option board firmware, ignore the alarm and re-enable the device once.

NOTE: If the Fusion4 portal is interfaced with the SSC-B device, make sure that there are no unprocessed transactions from the portal side before starting the firmware updation sequence.

5.17.2.1 Verify the Firmware Update

Verify the following to make sure that the files are updated.

1. Select <Versions> from the Info main menu to ensure the latest version is available in the column App. ver.



2. Verify the parameter settings to check if they are the same as they were previously in the old firmware.
3. Select <System health> from the Diagnostic main menu. Select one of the boards and then select <Ok>. The test should display, “Good/No Error”.

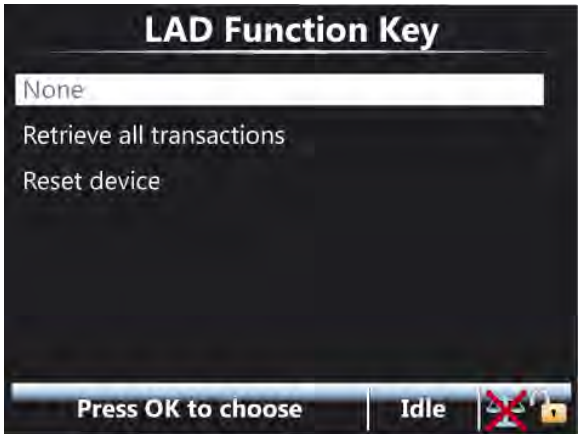
5.17.3 Test LED, Function Key, and LAD Information Submenus

- In the <Test LED> submenu (see the following screen), the following diagnostics or I/O tests can be visualized on the “Test” LED of the LAD.
  - HMI board
  - Device manager
  - Alarm manager
  - Transaction manager
  - Batch manager
  - HMI module
  - Display manager

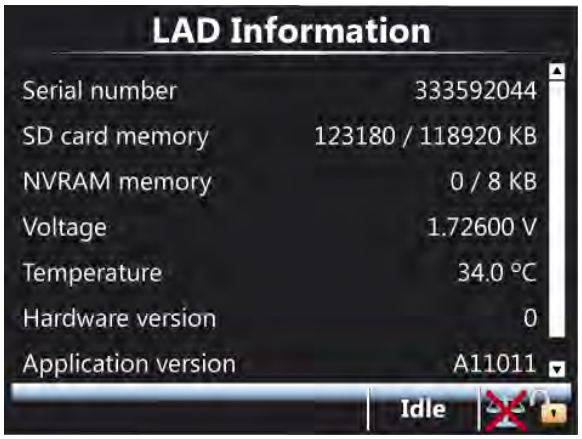
- LAD
- STREAM board
- Comms
- D1 AC 2
- DI DC 1
- DI DC 2
- DO AC 1
- DO AC 2
- PO DC 1
- PO DC 2
- PI
- DI AC1
- DO EMR
- Blend manager
- Additive manager
- STREAM module
- OPTION board
- OPT Comms
- OPT DO EMR
- OPT DI AC 1
- OPT DI AC 2
- OPT DI AC 3
- OPT DI AC 4
- OPT AO DC
- OPT RTD
- OPT DO AC
- OPT DI DC 1
- OPT DI DC 2
- OPTION module
- OPT AI DC

NOTE: Test LED functions are inactive while retrieving other records from the LAD.

- In the <Function key> submenu, specific functions can be programmed to the “F key” of the LAD, in order to achieve a much quicker operation of the SSC.
- This configuration is saved on the LAD, so changes made to the function key works with other devices as well.



- Select the <LAD information> submenu results in an overview of all relevant LAD information and diagnostics.
  - Serial number
  - SD card memory
  - NVRAM memory
  - Voltage
  - Temperature
  - Hardware version
  - Application version
  - Bootloader version



5.17.4 W&M Sealing

The <W&M sealing> submenu gives the option to unseal the W&M sealing.

CAUTION

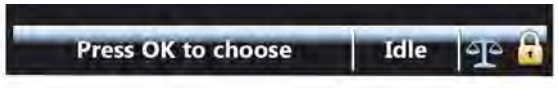
CAUTION! Only notified bodies and accredited service engineers can seal the device again and change the W&M password.

NOTE: Non-accredited users do not see the, <Seal> and <Change password> options in this screen.

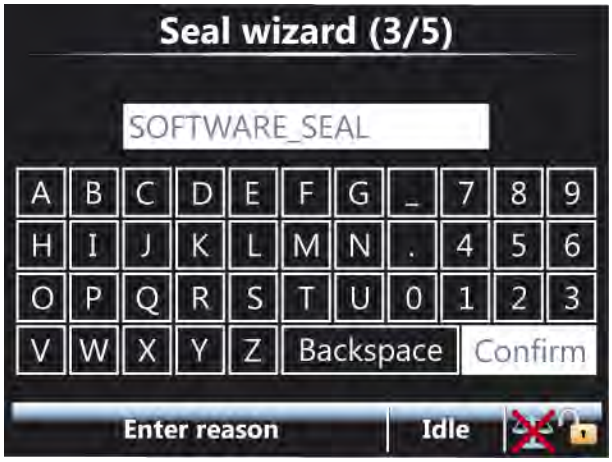
5.17.4.1 W&M Sealing Wizard

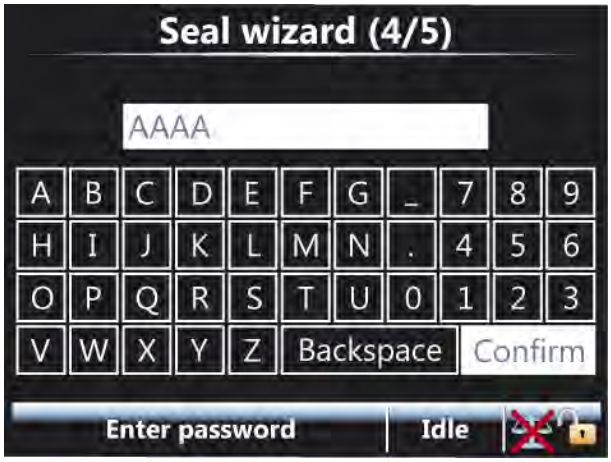
With the sealing wizard, the W&M-relevant entities and the firmware of all the boards are protected against changes.

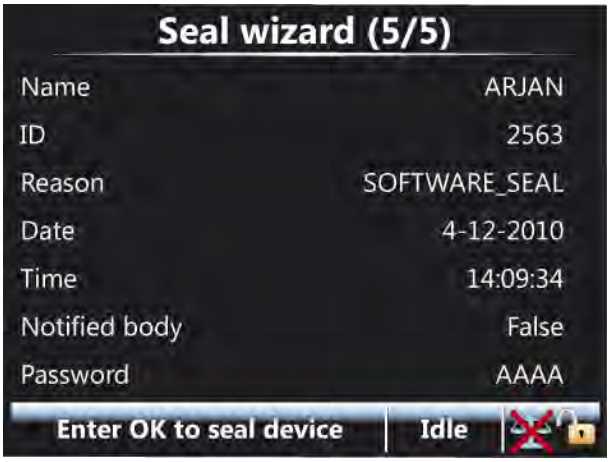
When a W&M-intended SSC-B is sealed, a balance icon without a red cross is present in the task bar. See the following screen.



Select W&M sealing wizard. Following screens appear.







5.17.5 Format SD Card

With this option the SD card of the LAD can be formatted.

CAUTION

CAUTION! All content is erased!

CHAPTER 6 ALARM HANDLING

6.1 General

Through the SSC menu, various alarm configurations can be set. Moreover, active alarms, transactions alarms, and alarm logs can be displayed.

6.2 Alarm Output Configuration

- The alarm-indication output can be set with [Alarm indication] I/O binding.
- The alarm-permissive output can be set with [Alarm shutdown] I/O binding.

6.3 Alarm Configuration

Each alarm initiates an action, which can be configured.
See the following table.

Alarm setting	Effect
Disabled	The alarm is ignored.
Display	• Alarm shown on the display • Alarm-indication output set to ON
Shutdown (default)	• Alarm shown on the display • Alarm-indication output set to ON • Alarm-shutdown output set to ON • Running transactions are stopped • Start-up of new transactions impossible

NOTE: Per alarm, more options can be configured.

6.4 Stream Alarms

Alarm	Cause
Control failure	The control failure alarms are generated when the deviation count is outside the [outer control window] for [control failure timeout].
VCF error	The volume correction calculations detected an error.
Pulse phase	Pulses are out of phase. *Only if the device has been configured for quad pulse.*
Temperature error	The temperature sensor returned an invalid value or the value exceeds the configured alarm threshold value.
Pressure error	The pressure sensor returned an invalid value or the value exceeds the configured alarm threshold value.
Blend stream percentage	The transactional blend stream percentage is higher than the target blend percentage plus the [high percentage allowed], or the transactional blend stream percentage is lower than the target blend percentage minus the [low percentage allowed].
Leaking valve	Device was idle, but more than the [leaking volume limit] was measured.
Wild stream closing volume	The permissive was dropped, but the SSC is measuring more wild stream volume than the [wild stream closing volume].
Blend stream closing timeout	The blend valve was not closed in the [Blend stream closing time].
No activity	The SSC started a new transaction, but after the [no activity timeout] still no wild stream was detected.
Flush volume	The SSC was in the slow-flow state (clean-arm function), and [Flush volume] (wild stream) minus the [Flush volume deviation] was not measured.
Stream start error	Error during new transaction start-up.
No pump	The pump did not receive a feedback signal in the [pump feedback timeout]. *Only possible if the I/O binding for pump ON/OFF and pump indication are configured.*
Factored pulse out	The factored pulse output channel (blend volume output) was configured such that it cannot keep track of the blend volume.
No hydraulic pump	The hydraulic pump did not receive a feedback signal in the [hydraulic feedback timeout]. *Only possible if the I/O binding for hydraulic pump ON/OFF and hydraulic pump indication have been configured.*
Tank low level	The tank is almost empty but the running transaction can be continued until the “Tank empty” alarm is set.
Tank empty	The tank is empty, the transaction cannot be finished.
Block valve fault	When the system is not able to activate or deactivate the block valve.

Alarm	Cause
Pulse hardware fault	This alarm is generated when the pulse input module detects the following error conditions. • Error reading information from the PIC controller • Pulse overflow errors • BAD health of pulse input function

6.5 HMI Alarms

Alarm	Cause
No option board	Option board disappeared. *Only if an option board was detected during start-up.* *NOTE: If this alarm appears just after the firmware upgrade of the option board, ignore the alarm and re-enable the device.*
No stream board	Stream board disappeared. *NOTE: If this alarm appears just after the firmware upgrade of the stream board, ignore the alarm and re-enable the device.*
License key	No license key set. *Determines additive or blending mode.*
Batch permissive	SSC was about to start transaction, but during creating a transaction record some error occurred.
Interboard connection	Communication between ARM processor and the HMI processor failed.
HMI fatal error	Unknown fatal error
Service due expired	The [Next scheduled service] date has been expired.

6.6 Alarm Logs

Any alarm-state change that occurs is logged with a time stamp.

In the Alarm log screen, all alarm states that have been changed can be examined.

6.7 Active Alarms

The Active alarms screen shows all active and acknowledged alarms.

An active alarm can be acknowledged in the Active alarm screen by selecting this alarm and then select <OK>. The state of the alarm now changes to <ACKNOWLEDGED>, and a new alarm log item is created.

This can also be done through Comms, by entering the relevant alarm number into [acknowledge the specified alarm].

It is also possible to reset all alarms with the command <RE-ENABLE>. This results in all alarms being reset to the state <INACTIVE>.

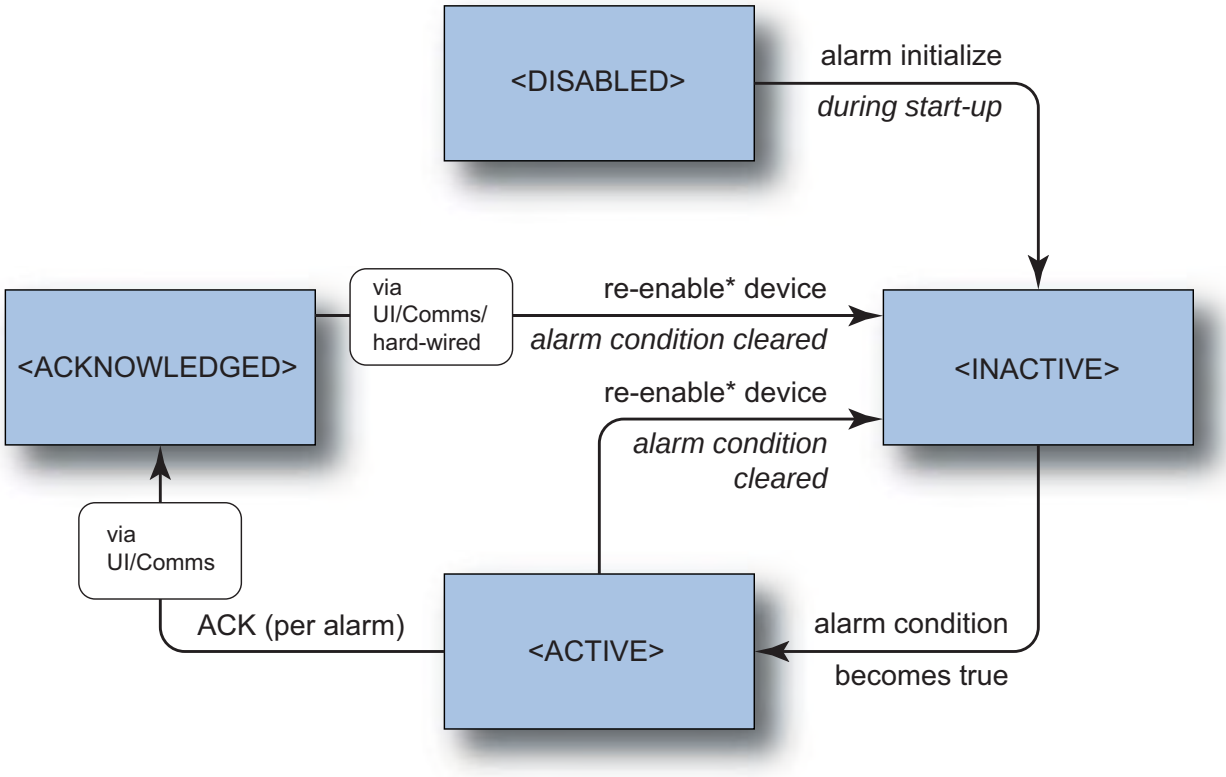
This can also be done through Comms through [reset all alarms], or hard-wired. For the latter, the entity [I/O binding alarm reset input] must be configured accordingly.

6.7.1 Alarm Manager Entities

- By reading the [active alarm bitmask] using the Fusion4 Portal, the active alarm ID appears. Each alarm has a unique ID. Combined alarms are possible as well.

ID	Alarm message
0x0000	NO_ALARM
0x0001	ALARM_GENERAL_FAIL_HMI
0x0002	ALARM_NO_COMMUNICATION
0x0004	ALARM_FATAL_ERROR
0x0008	ALARM_STREAM_BOARD_FAILURE
0x0010	ALARM_OPTION_BOARD_FAILURE
0x0020	ALARM_LICENSE_FAILURE
0x0040	ALARM_BATCH_PERMISSIVE
0X0080	ALARM_SERVICE_DUE_REMINDER
0x0100	STREAM_ALARM_GENERAL_FAIL_STREAM
0x0200	STREAM_ALARM_CONTROL_FAILURE
0x0400	STREAM_ALARM_VCF_ERROR
0x0800	STREAM_ALARM_PULSE_PHASE
0x1000	STREAM_ALARM_PULSE_GENERAL
0x2000	STREAM_ALARM_TEMPERATURE_ERROR
0x4000	STREAM_ALARM_PRESSURE_ERROR
0x8000	STREAM_ALARM_STREAM_PERCENTAGE
0x10000	STREAM_ALARM_LEAKING_STREAM_VALVE
0x20000	STREAM_ALARM_WILD_STREAM_CLOSING_VOLUME
0x40000	STREAM_ALARM_BLEND_STREAM_CLOSING_TIME
0x80000	STREAM_ALARM_NO_ACTIVITY_TIMEOUT
0x100000	STREAM_ALARM_FLUSH_VOLUME
0x200000	STREAM_ALARM_STREAM_START_ERROR
0x400000	STREAM_ALARM_NO_PUMP_SENSE
0x800000	STREAM_ALARM_FACTORED_PULSE_OUT
0x1000000	STREAM_ALARM_NO_HYDRAULIC_PUMP_SENSE
0x2000000	STREAM_ALARM_TANK_LOW_LEVEL
0x4000000	STREAM_ALARM_TANK_EMPTY

- By reading the [Total numbers of implemented alarms] using the Fusion4 Portal, the number of alarms available is shown.
- By reading the [Alarm state] using the Fusion4 Portal, the state of all alarms in the device are shown.
  There are four possibilities:
  - <DISABLED>
  - <INACTIVE>
  - <ACTIVE>
  - <ACKNOWLEDGED>
- [Critical] If an alarm is WnM-related, this field is set.
  Used in transaction record. If an alarm is configured for shutdown, display = critical. If any other alarm configuration, display = not critical.
- [Non-critical] Any other alarm that is not WnM-related.
  Used in transaction record.



* re-enable = clear all alarms

FIGURE 6-1 Operational alarm states ESF10-0030

6.8 Alarms through Communication

Also SSC-B alarms - as listed in the table from section 6.7.1 - are used in the protocols running through the communication channel (Comms). These values are determined by reading the 4-digit alarm value in the transaction-record detail for a previously completed transaction.

The entity [alarm_name_alarm_action] defines if the particular alarm is handled as a “Critical transaction alarm” or a “Non-critical transaction alarm”.

When configured as “Shutdown”, the particular entity is handled as a “Critical transaction alarm”.

See the following table.

ID	Alarm message
0x0000	NO_ALARM
0x0001	ALARM_CONTROL_FAILURE
0x0002	ALARM_BLEND_PERCENTAGE
0x0004	ALARM_LEAKING_BLEND_VALVE
0x0008	ALARM_WILD_STREAM_CLOSING_VOL
0x0010	ALARM_BLEND_STREAM_CLOSING_TIME
0x0020	ALARM_NO_ACTIVITY
0x0040	ALARM_FIRMWARE_CORRUPT
0x0080	ALARM_VCF_ERROR
0x0100	ALARM_FLUSH_VOLUME
0x0200	ALARM_LICENSE_ERROR
0x0400	ALARM_VALVE_ERROR
0x0800	ALARM_POWER_FAILURE
0x1000	ALARM_PULSE_ERROR
0x2000	ALARM_NO_PUMP
0x4000	ALARM_SENSOR_ERROR
0x8000	ALARM_TANK_MONITOR_ERROR

For More Information
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