Installation

E
1(1)

MCC
Marine Commercial Control

D9, D12, D16

Contents

General Information

About the Installation Manual

This publication is intended as a guide for the installation of the MCC (Marine Commercial Control). The publication is not comprehensive and does not cover every possible installation, but is to be regarded as recommendations and guidelines applying to Volvo Penta standards.

⚠ **IMPORTANT!** Installation of electrical systems shall only be carried out by a professional marine electrician.

⚠ **IMPORTANT!** Before attempting to install the MCU to its power supply or other external devices, always refer to General Arrangement Drawing for detailed information concerning installation. When in doubt, contact Volvo Penta.

The recommendations in this manual are the result of many years practical experience of installations all over the world. Departures from recommended procedures etc. can however be necessary or desirable, in which case the Volvo Penta organisation will be glad to offer assistance in finding a solution for your particular installation.

Installation manual for skilled professionals

This Installation Manual has been published for professionals and qualified personnel. It is therefore assumed that persons using this book have sufficient knowledge of marine drive and monitoring systems and are able to carry out related mechanical and electrical work.

It is the sole responsibility of the installer to ensure that the installation work is carried out in a satisfactory manner, that it is operationally in good order, that the approved materials and accessories are used and that the installation meets all applicable rules and regulations.

Only parts delivered or approved by Volvo Penta

Only components, cables, connections etc, delivered or approved by the manufacturer may be used. The manufacturer will take no responsibility what so ever if this requirement is violated.

Updates in Service Bulletins

Volvo Penta continuously upgrades its products and reserves the right to make changes. All the information contained in this manual is based on product data available at the time of going to print. Notification of any important modifications to the product causing changes to installation methods after this date will be made in Service Bulletins.

Installation

Great care must be taken in the installation of engines and their components. Always make absolutely sure that the correct specifications, drawings and any other data are available before starting work.

Plan installations with care

The installation must be planned very thoroughly and done with the greatest care. Plan the installation so that it is easy to carry out routine service operations involving the replacement of components (compare the Service Manual with the original drawings showing the dimensions).

⚠ **IMPORTANT!** Maximum permissible length of cable from engine to panel, is 40 m [130 ft].

The connection cable between the engine and the instrument panel must be securely clamped. Remember that the connectors must also be supported so that they are not subjected to any tension. Cables must not be run too close to hot components on the engine or close to any other source of heat. Make sure that it is protected from mechanical wear, sharp edges and water splashes. If necessary, run the cable through protective conduits.

⚠ **IMPORTANT!** Cables must also be run on a safe distance from equipment that may disturb communication signals, i.e. radio transmitters or high current equipment.

Avoid making joints in the system as far as possible. Cables and any joints must be accessible for inspection and service

NOTE! The connectors must be installed “dry”, they must not be packed with Vaseline etc.

Joint liability

Each engine consists of many components working together. One component deviating from its technical specification can cause a dramatic increase in the environmental impact of an engine. It is therefore vital that systems that can be adjusted are adjusted properly and that Volvo Penta Genuine Parts as used.

Certain systems (components in the fuel system for example) may require special expertise and special testing equipment. Some components are sealed at the factory for environmental reasons. No work should be carried out on sealed components except by authorised personnel.

Environment

Remember that most chemical products damage the environment if used incorrectly. Volvo Penta recommends the use of biodegradable degreasing agents for cleaning engine components, unless otherwise indicated. Take special care when working on board boats to ensure that oil and waste are taken for destruction and not accidentally pumped into the environment with bilgewater.

Certified engines

The manufacturer of engines certified for national and local environmental legislation pledges that this legislation is met by both new and currently operational engines. The product must compare with the example approved for certification purposes. So that Volvo Penta, as a manufacturer, can pledge that currently operational engines meet environmental regulations, the following must be observed during installation:

- Service of fuel pumps, pump settings and injectors must always be carried out by an authorised Volvo Penta workshop.
- The engine must not be modified in any way except with accessories and service kits developed for it by Volvo Penta.
- Installation of exhaust pipes and air intake ducts for the engine compartment must be carefully planned as its design may affect exhaust emissions.
- Seals may only be broken by authorised personnel.

⚠ **IMPORTANT!** Use only Volvo Penta Genuine Parts. **Otherwise AB Volvo Penta will no longer take responsibility for the engine meeting the certified design.** All damage and costs caused by the use of non-genuine replacement parts will not be covered by Volvo Penta.

Safety Information

Introduction

Read this Installation Manual carefully before installation. Improper installation may result in personal injury or damage to property or the engine itself.

If you do not understand or are uncertain about any operation or information in this Installation Manual, please contact Volvo Penta organisation.

Installation

This Installation Manual is produced for professional use only and must be used in conjunction with the relevant Operator's Manual.

Volvo Penta will not assume any liability whatsoever for damage to materials or personal injury, which may result if the installation instructions are not followed or if the work is carried out by non-professional personnel.

The installer is responsible for ensuring that the system operates in accordance with this Installation Manual.

Work Procedures

Refer to the specific Operator's Manual for relevant information where necessary, especially regarding safety and engine operation.

The work must be performed at Volvo Penta's service workshops, boat builders or other authorized and suitably equipped workshops with personnel who have appropriate qualifications and experience.

Important!

The following special warning symbols are found in this manual and on the engine.

⚠ **WARNING!** Possible danger of personal injury, damage to property or mechanical malfunction if the instructions are not followed.

⚠ **IMPORTANT!** Used to draw your attention to something that can cause damage to or malfunction of a product or damage to property.

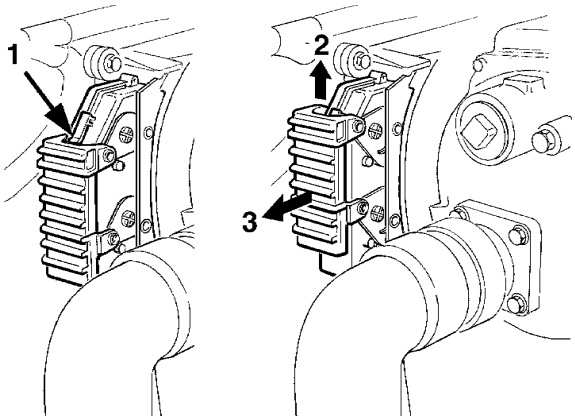
NOTE! Used to draw your attention to important information that will facilitate the work or operation in progress.

Safety directions for maintenance and service

⚠ **WARNING!** Installation, maintenance and service must be carried out with the engine stationary unless stated otherwise in the instructions. Prevent inadvertent start of the engine by turning off the power with the main switch, locking it in the off position. Disconnect primary and secondary power supply (positive(+) and negative(–) leads) and disable auxiliary starters. Place warning signs stating that work is in progress in every position from which the engine can be started.

Below is a summary of the risks you must observe and the safety precautions you must carry out when installing and configuring the Control System.

⚠ Before carrying out electric arc welding, these measures of precaution should be at taken.



1. Disconnect primary and secondary power supply (positive(+) and negative(–) leads).
2. Remove the connector from the engine control unit. Press in the lock tab (1), move the locking brace (2) up and pull the connector (3) out. Refit the connector to the engine control unit after disconnecting the welding equipment.
3. Disconnect fuses in the electrical connection box on the engine.
4. Disconnect the 8-pole connector positioned below the auxiliary stop-button.

⚠ Take care to avoid all moving parts of the engine during testing and operation. Approaching an engine which is operating is a hazard to personal safety. Loose clothing or long hair can become entangled in moving parts, and may cause serious personal injury.

⚠ Never carry out work on an engine that is suspended from a hoist.

⚠ Only start the engine in a well-ventilated area. If operating the engine in a closed area ensure that there is exhaust ventilation leading out of the work area to remove exhaust gases and crankcase ventilation emissions.

⚠ The engine must not be run in areas where there are explosive materials or gases.

⚠ Never allow an open flame or electric sparks near the batteries. Never smoke in proximity to the batteries. The batteries give off hydrogen gas during charging, which when mixed with air can form an explosive mixture. This gas is easily ignited and highly flammable. Incorrect connection of the battery can cause a single spark, which is sufficient to cause a gas explosion. Do not alter the battery connections when attempting to start the engine (spark risk) and do not lean over any of the batteries. Refer to instructions in the Engine Instruction Manual.

⚠ Always ensure that the + (positive) and – (negative) battery leads are correctly installed on their corresponding terminal posts on the batteries. Incorrect installation can result in serious damage to the electrical equipment. Refer to the wiring diagrams in the Engine Instruction Manual.

⚠ Always use protective eyewear when charging or handling the engine batteries. The battery electrolyte fluid contains sulphuric acid which is highly corrosive. If the battery electrolyte fluid comes into contact with unprotected skin, wash off immediately using copious amounts of clean water and soap, then seek medical assistance. If the electrolyte fluid comes in contact with the eyes, flush the eyes immediately (preferable using an eye bath) with copious amounts of clean water, and obtain medical assistance without delay.

⚠ **IMPORTANT!** AB Volvo Penta has developed and tested the complete system and its components. Non-original Volvo Penta components or components installed in a way that differ from the instructions may cause malfunction of the system.

⚠ **IMPORTANT!** Use only Genuine Volvo Penta Spare Parts.

Use of non-original AB Volvo Penta spare parts will result in AB Volvo Penta being unable to assume liability for the engine meeting engine certification requirements. Any type of damage resulting from the use of non-original Volvo Penta replacement parts for the roduct will not be covered under any warranty provided by AB Volvo Penta.

Presentation

MCC

The Volvo Penta Marine Commercial Control (MCC) is a control & monitoring system for marine applications. The Marine control unit (MCU), Engine Control Unit and Power Module, together with the Shutdown unit (SDU), provides completely redundant engine control.

MCU

The MCU communicates with Engine Management System via the CAN serial line using standard J1939 and J1587 communication protocols and controls and monitors the engine in 4 different applications – Propulsion, emergency, auxiliary and combined.

Equipped with a powerful graphic display with icons, symbols and bar-graphs for intuitive operation, together with high functionality this sets new standards in engine controls.

Functions

- On screen alarm list indication
- Event and time driven engine history for back tracing
- Running hours meter, number of starts counter
- Configurable 14 binary inputs and 14 binary outputs and 8 analog inputs
- Magnetic pick-up speed measurement (+redundant channel)
- Extension units for more I/O and Remote Display panel
- Password protection
- 4 operational modes – emergency, auxiliary, harbor and propulsion
- 5 languages selectable on MCU

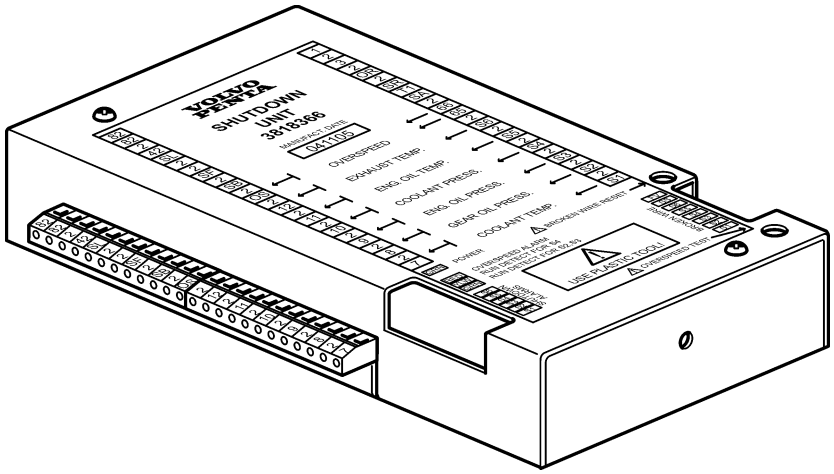
Communication

- RS232 / Modbus RTU
- J1939, J1708/J1587

SDU

The Volvo Penta Marine Commercial Control protects the engine using the Volvo Penta shutdown unit (SDU). The SDU is a stand-alone hard wired system for engine protection with separate hard-wired senders and switches inputs and Fuel stop outputs, providing a completely redundant protection system.

- 6 shutdown channels and an overspeed shutdown
- All channels equipped with broken wire detection
- Broken wire reset button
- Test button for overspeed shutdown test
- DIN 35-rail mounting



Marine Commercial Control

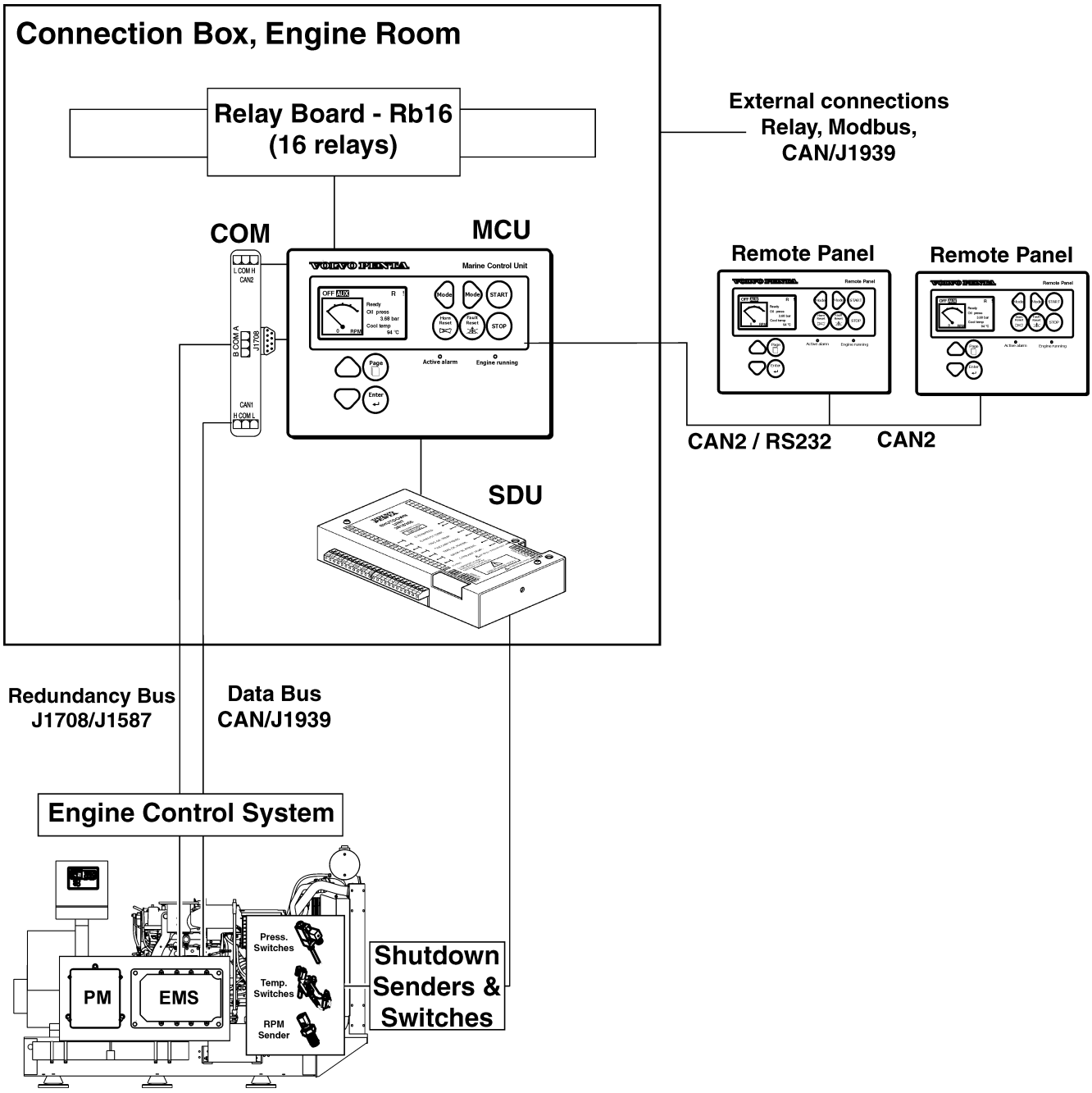
This chapter describes functions and operation of the Marine Commercial Control system (MCC) and the MCU (Marine Control Unit).

Applications and Modes

The MCC system can be configured for different applications. Auxiliary (AUX), Emergency (EME), Combined (CMB) and Propulsion (PRP). The difference lies in the configuration file for the software and in the connections between the MCU and SDU. In each application the system operate in a number of modes.

Application	Modes	Interface to Start/Stop the engine	Note
Auxiliary	OFF-AUX	Blackout start on terminal Start on terminal Stop on terminal Start button on MCU and RP Stop button on MCU and RP	Blackout start will give the number of start attempts specified in the setpoint “Crank attempts”.
Emergency	OFF-EME	Blackout start on terminal Start on terminal Stop on terminal Start button on MCU and RP Stop button on MCU and RP	Blackout start will give unlimited number of start attempts.
Combined	OFF-EME-HRB	In EME Mode Blackout start on terminal Start on terminal Stop on terminal Start button on MCU and RP Stop button on MCU and RP In HRB Mode Start on terminal Stop on terminal Start button on MCU and RP Stop button on MCU and RP	Blackout start will give unlimited number of start attempts. Blackout start inactive. Controller operates like in AUX mode.
Propulsion	OFF-PRP	Start on terminal Stop on terminal Start button on MCU and RP Stop button on MCU and RP	Only on variable speed engines. Blackout start inactive

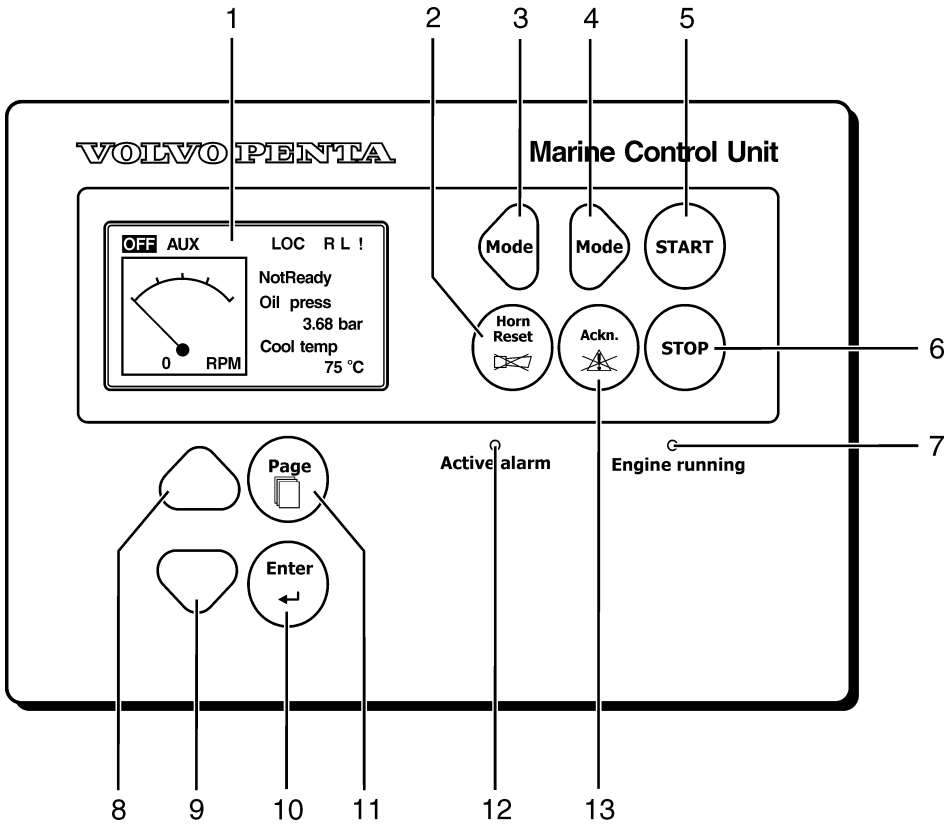
MCC system overview



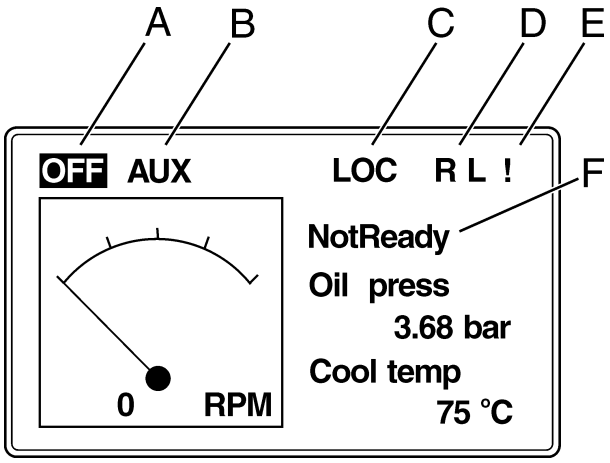
Terminology

MCC	Marine Commercial Control, name of the over all system.
MCU	Marine Control Unit, the central control unit of the system.
SDU	Shutdown Unit, for engine protection. Activates a fuel shut-off valve to shut down the engine. Separated from the engine control system. All functions hard wired.
COM	Communication Module, for J1708/J1587 and CAN2 bus (for RP and other extension modules).
RP	Remote Panel, additional display panel for remote monitoring.
EMS	Engine Management System monitors engine status and handles engine speed and torque governing and overall control of fuel injection and emission control algorithms.
PM	Power Module, handles power distribution and power management. It also monitors power supply and switches to secondary power.

MCU Panel layout



1. LCD display
2. Horn reset (stops sound alarm)
3. Mode Left, toggles modes backwards [Off - AUX(EME,HRB,PRP)]
4. Mode Right, toggles modes forwards [Off - AUX(EME,HRB,PRP)]
5. Start button
6. Stop button
7. LED - Engine running
8. Up button (Select and Increase)
9. Down button (Select and Decrease)
10. Enter (confirmation of selection)
11. Page, toggles screens (Measurement - Adjustment - History)
12. LED - Active alarm (Blinking light when new alarm is activated. Steady light when alarm is active but confirmed.)
13. Acknowledge button



Display

A. Highlighted indicates OFF-mode

B. Highlighted indicates operational mode

AUX (EME, HRB or PRP)

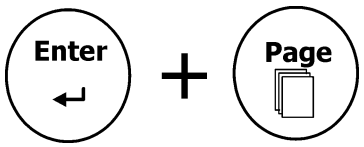
C. Indicates Local mode

D. R - Remote connection (Slave Panel or PC Software)

L - Access lock

E. ! - Active alarm

F. Engine state (NotReady - Ready - Running)



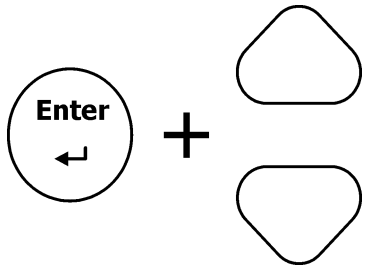
Info view

Serial number and software revision

In MAIN page (A1), press and hold ENTER while pressing PAGE. INFO view with serial number an software revision will appear.

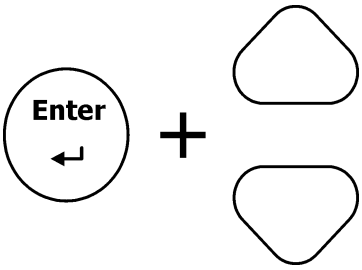
NOTE! INFO view is only displayed for 10 seconds.

MCU adjustments



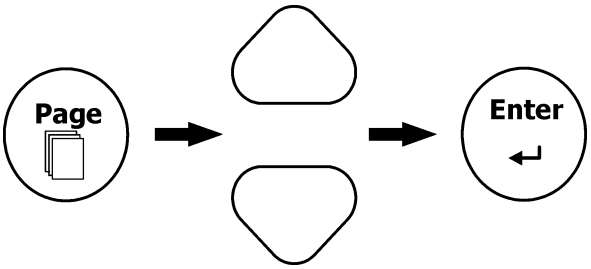
Backlight - INFO view

In INFO view, press and hold ENTER and adjust brightness with UP/DOWN buttons.



Contrast - MAIN page

In MAIN page (A1), press and hold ENTER and adjust contrast using UP/DOWN buttons.



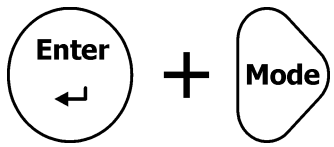
Change language - INFO view

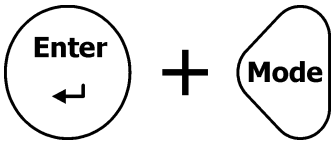
In INFO view, press PAGE. Use UP/DOWN buttons to scroll. Press ENTER to select language and exit window.

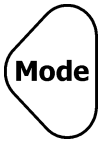
Enter password

Password is a 4 digit code.

1. Select Adjustment view (C1).
2. Select PASSWORD (C1) with UP/DOWN buttons. Confirm with ENTER button.
3. Select ENTER PASSWORD (C2) with UP/DOWN buttons. Confirm with ENTER button.
4. Select digits with UP or DOWN buttons. Confirm with ENTER button.







Operational modes

Local mode

In Local Mode the MCU is operational only from the main panel. All external interfaces are disabled.

Local mode is activated by pressing ENTER + MODE- Right buttons.

Local mode is deactivated by pressing ENTER + MODE- Left buttons.

OFF-mode

OFF mode is available in all applications – AUX, EME HRB and PRP. All inputs are disabled and all outputs are switched off.

NOTE! Engine can not be started when OFF-mode is activated.

Activate OFF-mode by pressing left MODE-button repeatedly until OFF is highlighted in upper left corner of display.

Menus

There are 4 display menus available:

Main

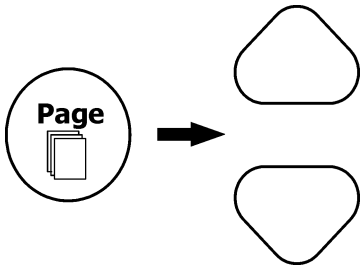
Measurement

Adjustment

History

Main

Press PAGE button to toggle the menu screens. Select MAIN page (A1). Use UP/DOWN buttons to toggle the different screens.



Alarm list

ECU (Engine Control Unit) alarm list and Alarm list are the last two screens in the MAIN page (A1).

Select MAIN page (A1). Press UP button (twice for ECU list).

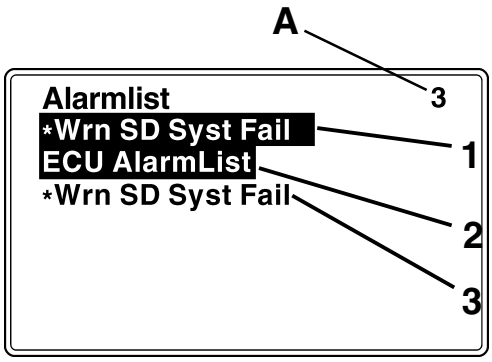
This will list all active alarms (number of alarms indicated in the upper right corner). Highlighted alarms are still active. The other alarms are not active but not yet acknowledged.

NOTE! In case of multiple alarms, scroll alarmlist using ENTER button.

ACKNOWLEDGE button acknowledges all alarms. Non-active alarms disappears from the list.

Alarm list appears on the screen when a new alarm is set and MAIN page (A1) is active.

NOTE! Alarm list is not activated when you are viewing values, parameters or history.

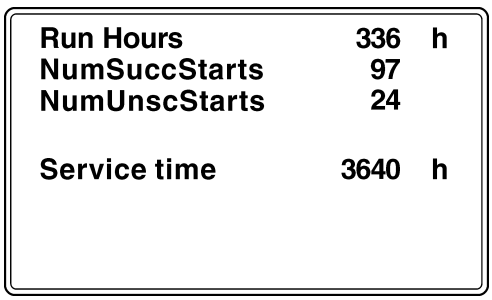


Three state Alarm list indication

1. Active not acknowledged alarm
2. Active acknowledged alarm
3. Inactive not acknowledged alarm

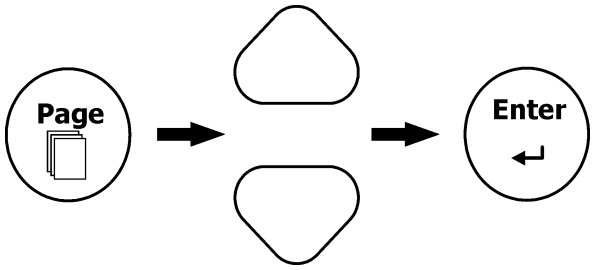
A. Number of alarms

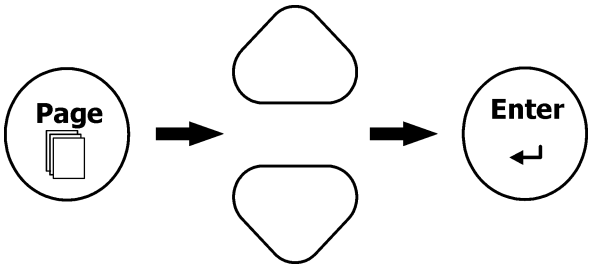
Statistics

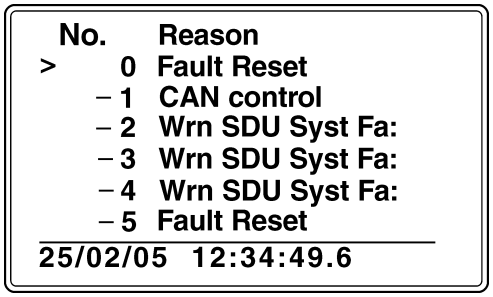


Select MAIN page (A1). Press UP button three (3) times.

1. Running hours
2. Successful starts
3. Unsuccessful starts
4. Service time (hours to service)







Statistic values can be adjusted from PC software (password protected), contact your Volvo Penta dealer.

Measurement

Press PAGE button repeatedly to toggle the menu screens. Select MEASUREMENT view (B1). Use UP/DOWN buttons to toggle the different screens.

Adjustment

In the Adjustment view it is possible to view and edit setpoints. For a complete list of setpoints, see

1. Press PAGE button repeatedly to scroll the menu screens. Select ADJUSTMENT screen.
2. Use Up and Down buttons to toggle the different set points group.
3. Press ENTER to confirm.
4. Use Up and Down buttons to select requested set point. Set points marked **"*"** are password protected.
5. Press ENTER to edit.
6. Use Up and Down buttons to modify the set point. When Up or Down button is pressed for 2 sec, auto repeat function is activated.
7. Press ENTER to confirm or PAGE to leave without change. Press PAGE to leave selected set points group.

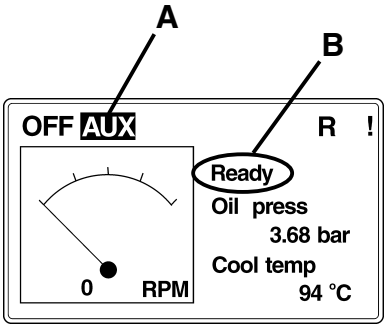
History

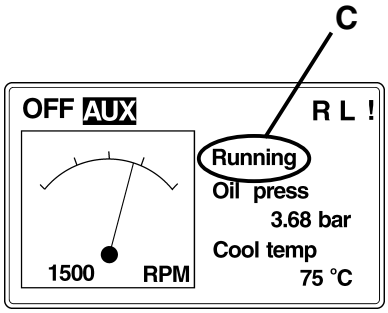
1. Press PAGE button repeatedly to scroll the menu screens. Select the HISTORY screen.
2. Use Up and Down buttons to select the requested record.
3. Press ENTER to select requested screen (record items) within displayed records.

Alarm list and History

Alarm list and History record prefixes

Prefix	Meaning
Wrn	Warning
Sd	Shutdown
Fls	Sensor fail





Operation

Starting the engine

1. In MAIN menu, select mode of operation (AUX, HRB, EME, PRP), refer to section ”Applications & Modes”), using MODE button (left or right)(A).
2. Make sure engine status is ”Ready”(B).
3. Press START button and the engine state should change to ”Running”(C).

Running

Operational data

Monitor engine data not visible in the MAIN screen:

1. Use PAGE button to select MEASUREMENT menu.
2. Use UP and DOWN arrows to select wanted engine data.

Alarms

Alarms are shown in two different screens depending on the origin of the alarm.

Alarms detected by the EMS or PM are shown in the ECU alarm list and alarms generated in the SDU or the MCU are shown in a separate alarm list.

1. Press HORN RESET button to silence the alarm.

To view active alarms:

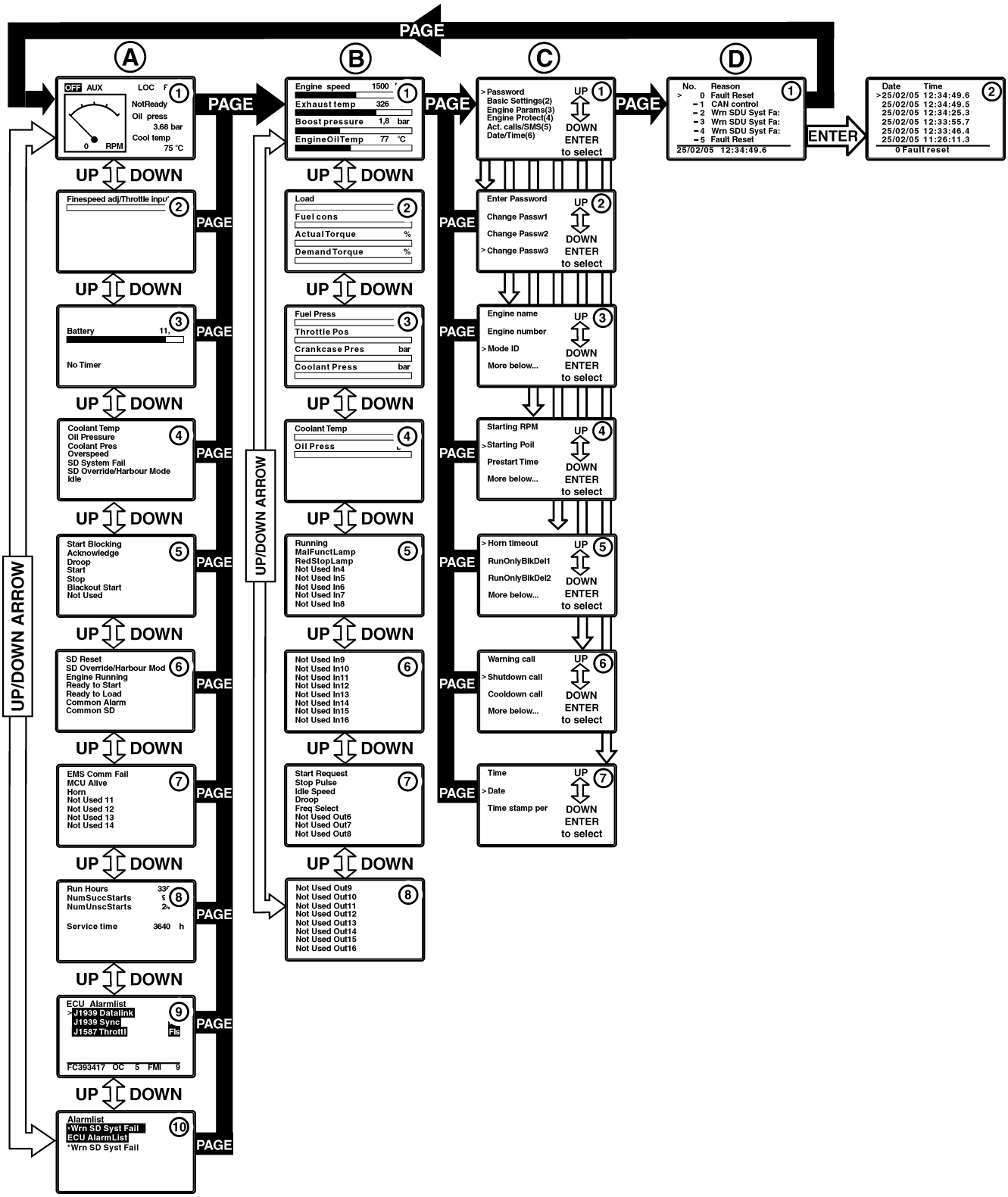
2. In MAIN view, press UP arrow once for SDU/MCU alarm list and twice for ECU alarm list.
3. In case of multiple alarms, scroll alarmlist using ENTER button.
4. Press ACKN. button to acknowledge all alarms.

NOTE! Alarm item will stay in alarm list until acknowledged and made ”not active” (fault rectified).

Stopping the engine

1. Press and hold STOP button until the rpm starts decreasing (approx. 1 s).
2. Make sure rpm indication decreases to 0 and engine state returns to ”Ready”.

MCU menu flow chart



Main page (A)

A1.
The main page of the system. Most important parameters are shown. Mode change is possible.

A2.
Displays analogue parameters measured by the MCU. In standard configuration only Throttle input (PRP) and Finespeed input (AUX,EME,CMB)

A3.
System voltage information measured by the MCU.

A4. & A5.
Status of MCU 14 digital inputs.
0 - input inactive
1 - input active.
Inverted 0 or 1 indicates alarm due to current status.

NOTE! Pages can be used to verify interface to superior system. Activate signal from superior system and monitor input state change.

A6. & A7.
Pages display status of MCU 14 digital outputs.
0 - input inactive
1 - input active.

A8.
Statistic information. Run hours of the engine, No. of successful start, etc.

A9.
Page displays alarms origining from Engine Management System (EMS) and Power Management System (PM). Navigate alarmlist with Enter button.

A10.
Displays alarms from the Shutdown system (SDU) and MCU. Navigate alarmlist with Enter button.

NOTE! Engine cannot be started with active or unacknowledged SD.

Measurement (B)

B1. - B4.
Pages display monitoring values from (EMS).

B5. & B6.
Used by Volvo Penta service technicians. EMS to MCU CAN-bus information.

B7. & B8.
Used by Volvo Penta service technicians. MCU to EMS CAN-bus information.

Adjustments (C)

C1.
Menu for change of setpoints. Navigate with up and down arrows - select with Enter.

C2.
Enter and change passwords. Most setpoints are password protected to avoid accidental changing. Password 0 in standard configuration.

C3.
Page for changing basic settings of the systems, e.g governor mode and speed select.

C4.
Page for changing Engine parameters settings. Refer to section ”MCU adjustments” for details.

C5.
Page for changing parameters concerning MCU engine protection functionality.

NOTE! In the MCC system engine protection functionality is handled by the SDU. Changing these setpoints will not affect the SDU.

C6.
Changing setpoints concerning MCU telematics functionality.

NOTE! Telematics functionality is not supported by Volvo Penta. Refer to http://www.huegli-tech.com

C7.
Page or changing date and time.

History (D)

D1.
Displays previous actions/alarms. Enter button for further information(D2).

Setpoints

Below is a list of setpoints used in the system. The setpoints are grouped as:

- Basic settings
- Engine parameters
- Engine protection settings
- Active calls/SMS settings
- Date/Time settings

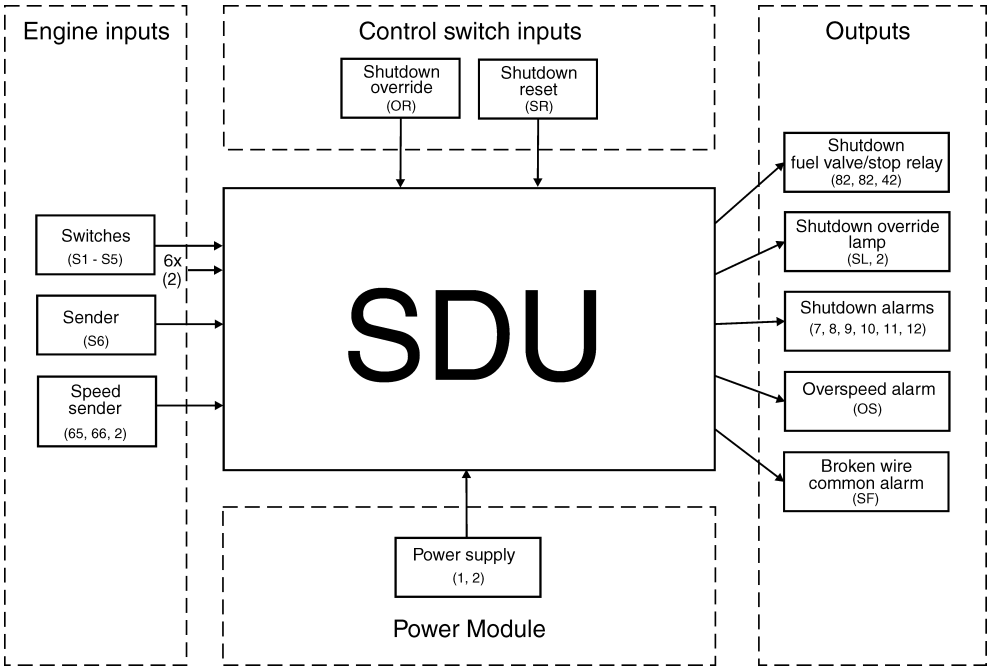
This is how they appear in the MCU menu.

Note! An ”N” in column ”Customer edit allowed” implies that the setpoint MUST NOT be edited by customer.

Basic settings

Setpoint	Unit (if applicable)	Note	Edit allowed (Y/N)
Engine name		User defined name for identification at remote (phone/mobile) connection. Max. 14 characters long.	N
Engine No.		Visible in INFO view	N
Mode ID		Defines operational MODE	N
Gear teeth		Number of teeth on flywheel	N
Nominal rpm	RPM	Nominal engine speed. Used to calculate overspeed protection limit and requested RPM %	N
Gov. mode		Activates/Deactivates logical binary output DROOP SW that can be configured to switch ECU mode	N
Idle/Nominal		Activates/Deactivates logical binary output NOMINAL SW that can be configured to switch ECU mode	N
Speed select		Activates/Deactivates logical binary output SECONDARY SW that can be configured to switch ECU nominal rpm	N
ECU diag		Alarm list indication	N
Contr. Addr.		Controller identification number. Can be edited by user when two or more MCU:s are connected, i.e. Propulsion EMS.	Y
RS232 mode		RS232 mode is default and must be used when downloading software. Must be set to MODBUS if that is used.	Y
CAN mode		CAN bus speed selection. Default is Low Speed CAN (50kbps), max. bus length is 900 meters.	Y
LightTimeOff	min	Time Out for automatic backlight switch off. Setpoint to 0 will give backlight continously. Backlight is automatically switched on at the touch of a button or any system event.	Y
MODBUS	bps	MODBUS interface speed selection	Y

Shutdown system overview



Shutdown unit (SDU)
The SDU has 6 shutdown channels and one overspeed shutdown.

S1 Cooling water temp

S2 Lube oil pressure, Marine Gear

S3 Lube oil pressure, Engine

S4 Cooling water pressure

S5 Oil temp (optional D12)

S6 Exhaust temp (optional D12)

S1 - S5 has a ~1 second delay: S6 has no delay.
S1 - S6 are enabled or disabled accord. to eng. spec.

Shutdown reset
Activated shutdown must be reset before engine can be restarted. Shutdown reset button on engine connection box or MCU ACKN. button.

NOTE! Shutdown reset button will still show SD alarm in MCU alarm list as not acknowledged alarm.

Acknowledge button on MCU panel will reset shutdown and clear alarm list.

Broken wire
All channels are equipped with broken wire detection that activate an alarm if connection is lost or power supply to SDU is lost. Yellow LED indicates broken wire. Reset alarm on Broken wire reset button (A).

NOTE! Use only plastic tool for reset.

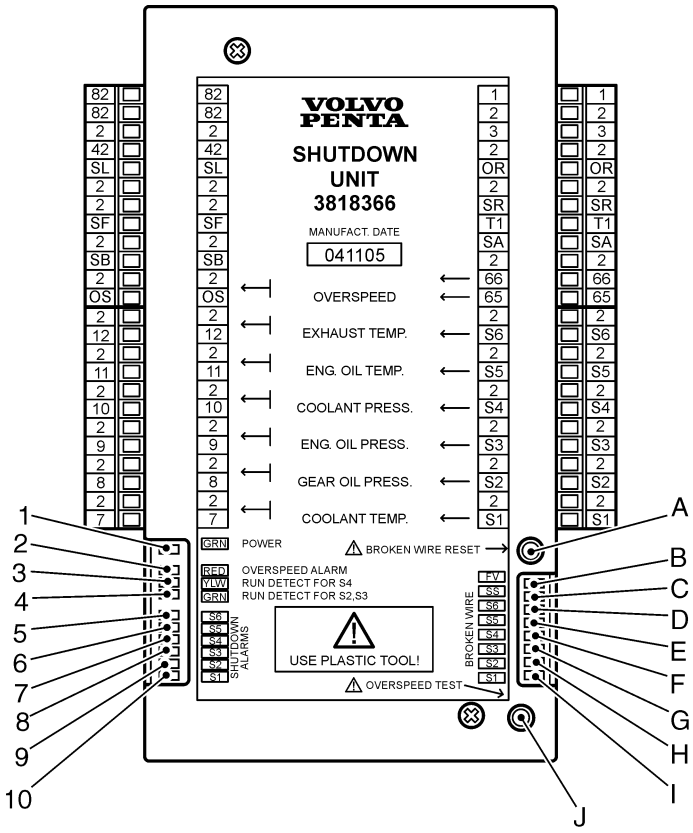
Overspeed shutdown
The overspeed function shuts down the engine in case of overspeed.

Overspeed test
To test the overspeed function push the overspeed test button (inside the SDU). When pushed the overspeed limit drops 25%.

Emergency mode (shutdown override)
The system can be overridden by activating the OR input (the Emergency mode lamp, when installed on output SL, will be activated). Override does not include overspeed.

Run detection
To avoid alarms when starting and stopping the engine an interlock for the shutdown pressure switches (run detection) is implemented.

SDU indications



1. Green – Power
2. Red – Overspeed Alarm
3. Yellow – Run detection S4
4. Green – Run detection S2, S3
5. Red – S6 Shutdown active
6. Red – S5 Shutdown active
7. Red – S4 Shutdown active
8. Red – S3 Shutdown active
9. Red – S2 Shutdown active
10. Red – S1 Shutdown active

A. Broken wire reset button
B. Yellow – Fuel valve Broken wire detected
C. Yellow – Speed sender Broken wire detected
D. Yellow – S6 Broken wire detected
E. Yellow – S5 Broken wire detected
F. Yellow – S4 Broken wire detected
G. Yellow – S3 Broken wire detected
H. Yellow – S2 Broken wire detected
I. Yellow – S1 Broken wire detected
J. Overspeed shutdown test button

Installation notes

For detailed information on installation, refer to General arrangement drawing for D9, D12, and D16 respectively.

Power supply

⚠ **IMPORTANT!** Before connecting an MCU to its power supply or other external devices, always refer to General Arrangement Drawing for detailed information concerning installation. When in doubt, contact Volvo Penta.

⚠ **IMPORTANT!** Wiring for binary inputs and analog inputs must not be lead parallel with high voltage/current cables

⚠ **IMPORTANT!** Min. diam. of power supply cable should be 1.5 mm^2.

⚠ **IMPORTANT!** Max. permissible continuous power supply voltage is 36 VDC.

⚠ **IMPORTANT!** Max permissible peak voltage is 39 VDC.

⚠ **IMPORTANT!** The MCU should be grounded properly in order to protect against atmospheric discharges.

Binary output protections

⚠ **IMPORTANT!** Do not connect binary outputs directly to DC relays without protection diodes. Use protection diodes even if the relays are not connected directly to controller outputs.

NOTE! RB16 relays include protection diodes.

Grounding

⚠ **IMPORTANT!** The shortest possible wire should be used when grounding the MCU.

⚠ **IMPORTANT!** Min. diam. of ground cable should be 2,5mm^2.

⚠ **IMPORTANT!** The “-“ terminal of the battery has to be properly grounded.

Connection to engine

For information on connection of MCU to engine, refer to ”General arrangement drawing”.

Interface information

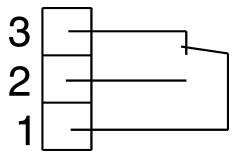
Wiring terminals

Terminal	Comment
1	**REDUNDANT POWER SUPPLY FROM PM (+)**
2	**REDUNDANT POWER SUPPLY FROM PM (-)**
A5	**REQUESTED RPM - PRP** Throttle signal to the engine. 4-20 mA signal representing 0 to 100 percent of RPM span. Idle speed is set when the signal is 0% (4mA). Maximum speed is set when the throttle is 100 %(20mA) **NOTE!** The signal must be connected to a 4-20mA current source otherwise an out of range alarm will be set.
B6	**SD OVERRIDE - AUX,EME,PRP** Active signal - Shorted to ground Inactive signal - Disconnected Disables all shutdowns except overspeed. **HARBOUR MODE - CMB** Active signal - Shorted to ground Inactive signal - Disconnected External switch between emergency and harbour mode.
B7	**IDLE - AUX,EME,CMB** Active signal - Shorted to ground Inactive signal - Disconnected Set the engine to idle speed. **NOTE!** Engine must be unloaded.
B8	**START BLOCKING** Active signal - Shorted to ground Inactive signal - Disconnected The startblocking signal is used for the engine from start. An alarm will be set if the engine is stopped and Startblocking signal is activated.
B9	**ACKNOWLEDGE/FAULT RESET** Active signal - Shorted to ground Inactive signal - Disconnected Acknowledge alarms through external interface.

Terminal	Comment
B10	**BLACKOUT START - AUX, EME** Active signal - Shorted to ground Inactive signal - Disconnected Start signal for several start attempts. AUX - Three starts attempts EME - Unlimited start attempts **BACKUP SPEED - PRP**
B11	**REMOTE START** Active signal - Shorted to ground Inactive signal - Disconnected For remote start of the engine.
B12	**REMOTE STOP** Active signal - Shorted to ground Inactive signal - Disconnected For remote stop of the engine.
B13	**SPEED UP - AUX, EME, CMB**
B14	**SPEED DOWN - AUX, EME, CMB**
BL	**BACKLIGHT FOR MCU Remote Panel**
X1	**SD OVERRIDE INDICATION - AUX, EME, PRP** Potential free Indicates avtive Shutdown override. **HARBOUR MODE INDICATION - CMB** Indicates harbour mode.
X2	**SPARE RELAY FUNCTION** NO or NC, refer to GA-drawing.
X3	**SPARE RELAY FUNCTION** NO or NC, refer to GA-drawing.
X4	**EMS COMMUNICATION FAILURE** Potential free Indicates that the bus communication to the Engine Management System (EMS) is ok
X5	**MCU INTERNAL PROCESSOR (CPU) READY** Potential free Indicates MCU active and system operational.

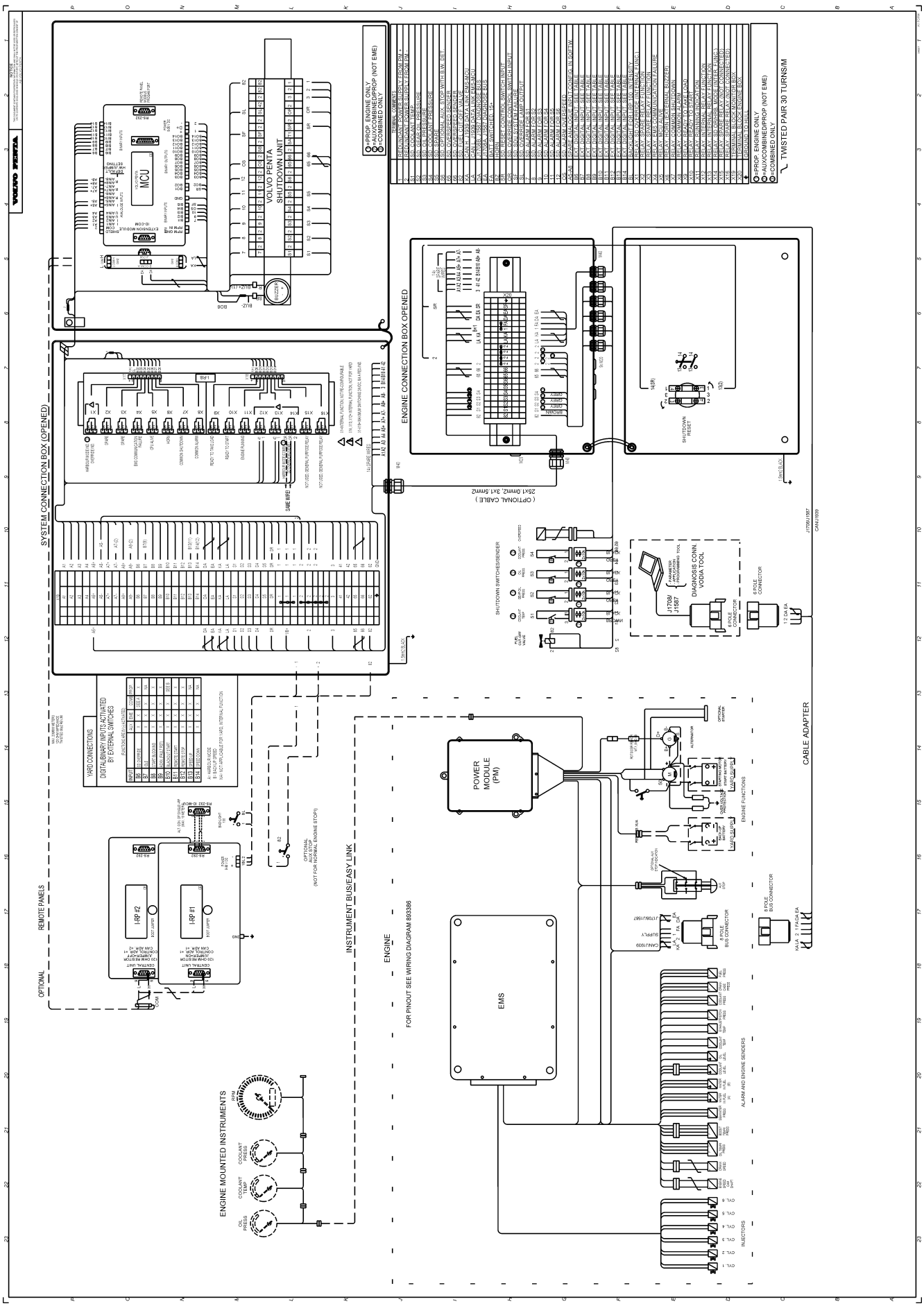
Relays X1 - X16

3. Normally Closed (NC)
2. Normally Open (NO)
1. Common

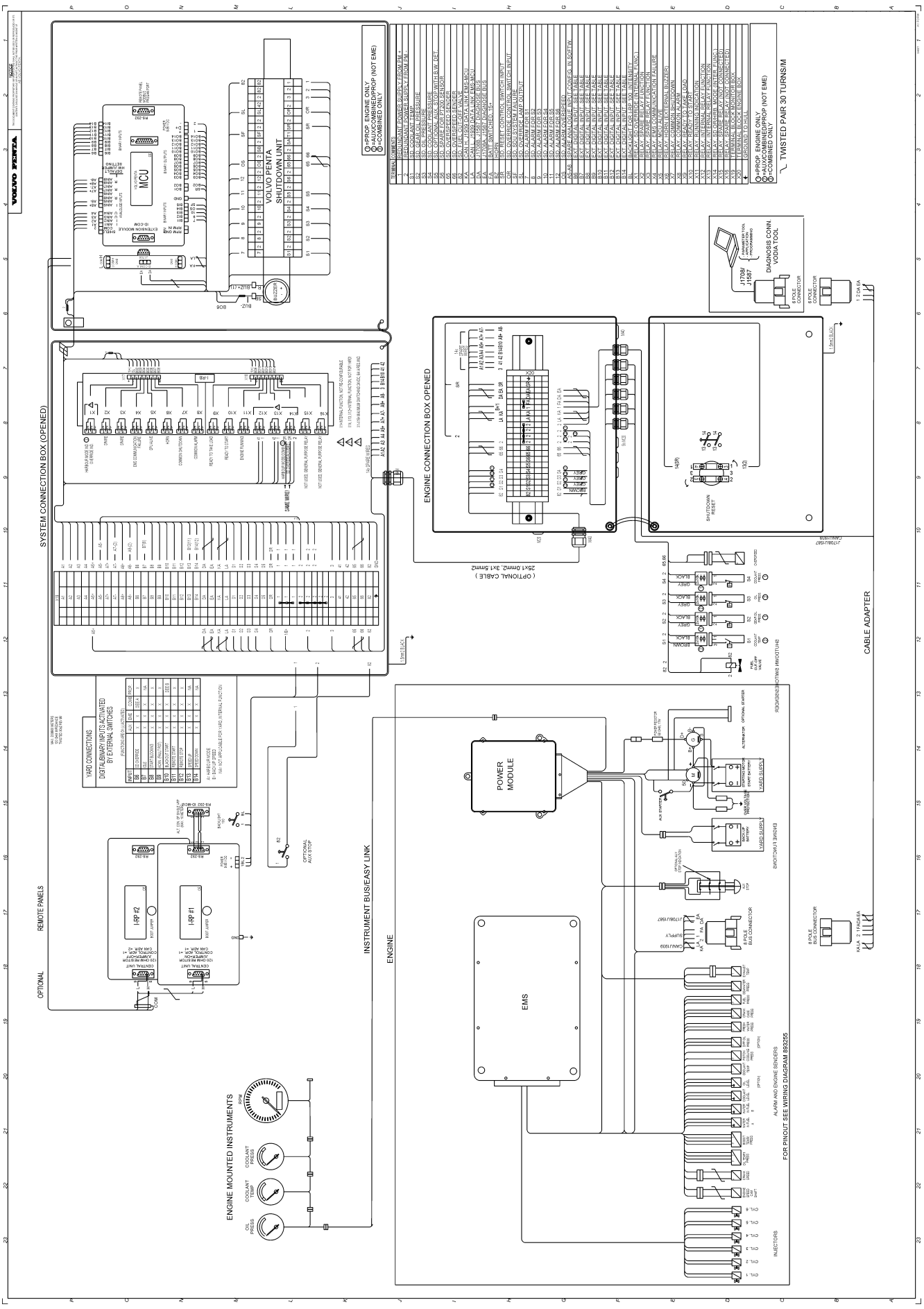


Terminal	Comment
X6	**HORN (EXTERNAL BUZZER)** Potential free For connection of external horn.
X7	**COMMON SHUTDOWN** Potential free Indicates active Shutdown.
X8	**COMMON ALARM** Potential free Indicates active alarm.
X9	**READY TO TAKE LOAD** Potential free Indicates that engine has reached nominal speed (ready to take load).
X10	**READY TO START** Potential free Indicates active Shutdown.
X11	**RUNNING INDICATION** Potential free Indicates that engine can be started
X12	**INTERNAL RELAY FUNCTION**
X13	**INTERNAL RELAY FUNCTION**
X14	**SD OVERRIDE INDICATION - AUX, EME, PRP** Shutdown override **HARBOUR MODE INDICATION - CMB** Harbour mode
X15	**SPARE RELAY FUNCTION** NO or NC, refer to GA-drawing.
X16	**SPARE RELAY FUNCTION** NO or NC, refer to GA-drawing.
X19	**TERMINAL BLOCK MONITOR BOX**
X20	**TERMINAL BLOCK ENGINE BOX**

General arrangement drawing D9/D16 MCC



General arrangement drawing D12 MCC



Technical data MCU

General

Power supply

Voltage range	8-36V DC
Consumption	0,34A at 8VDC
	0,12A at 24VDC
Battery voltage measurement tolerance	2 % at 24V
Real Time Clock (RTC) battery life-cycle	10 years

NOTE! RTC battery flat causes wrong Date&Time information only.

Operating conditions

Operating temperature	-20 ¸ +70 °C
Storage temperature	-30 ¸ +80 °C
Humidity	95% without condensation
Flash memory data retention time	10 years
Protection front panel	IP65

Dimensions and weight

Dimensions	180x120x50mm
Weight	800g

Binary inputs

Number of inputs	14
Input resistance	4.7 kΩ
Input range	0-36 VDC
Switching voltage, closed contact indication	0-2 V
Max voltage for open contact indication	8-36 V

Binary open collector outputs

Number of outputs	14
Maximum current (outputs BO1, BO2)	1A
Maximum current (outputs BO3 - BO14)	0,5 A
Maximum switching voltage	36 VDC

Group 1 AI1 – AI4

Number of inputs	4 unipolar
Resolution	10 bits
Jumper selectable range	V, Ω, mA
Maximal resistance range	2500 Ω
Maximal voltage range	4,0 V
Maximal current range	0 – 20 mA
Resistance measurement tolerance	± 2 % ± 2 Ω out of measured value
Voltage measurement tolerance	± 1 % ± 1mV out of measured value
Current measurement tolerance	± 1 % ± 0,5mA out of measured value

Group 2 AI5 – AI8

Number of inputs	4 bipolar
Resolution	(up to 16) bits
Jumper selectable range	V, ohm, mA, thermocoupler
Maximal resistance range	2500 Ω
Maximal voltage range	± 1000 mV or 100mV
Maximal current range	± 0 - 20 mA active, 0 - 20 mA passive
Resistance measurement tolerance	± 0,5 % ± 2 Ω out of measured value
Voltage measurement tolerance	± 0,5 % ± 1mV out of measured value
Current measurement tolerance	± 0,5 % ± 0,5mA out of measured value

RS232 interface

Maximal distance	10m
Speed	19.2kBd

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