The Drive & Control Company

Rexroth
Bosch Group

Hägglunds Spider2

Control system

User manual
RE 15330-WA/03.2015

Supersedes:
EN723-4 BR 2014
English

The intention of this manual is to give information about standard Spider II control system that is needed for usage of the system, to answer questions from the customers and to give a good level of information about the functions.
Information about specific order related connections and configuration is attached in the system documentation at delivery.
In order to find particular information, search for the wanted selection as listed in the table of contents. However, changes in the equipment may occur. We therefore reserve the right to introduce amendments in the manual as we deem necessary without notice or obligations.
All viewpoints that can make this manual better and more useful are welcome.

Send your viewpoints to:

documentation@boschrexroth.se

Contents

1 Warning signs

Safety instructions are formatted as follows:

⚠ SIGNAL WORD

Type of risk
Consequences of non-observance
▶ Safety precautions

- **Warning sign:** Draws your attention to the hazard
- **Signal word:** Indicates the degree of hazard
- **Type of risk!:** Specifies the type and source of the hazard
- **Consequences:** Describes the consequences of non-compliance
- **Precaution:** Specifies how the hazard can be prevented

Table 1: Risk categories to ANZI Z535.6-2006

Warning signs, signal word	Meaning
⚠ DANGER	Indicates a dangerous situation which will result in death or serious physical injury unless averted.
⚠ WARNING	Indicates a dangerous situation which could result in death or serious physical injury unless averted.
⚠ CAUTION	Indicates a dangerous situation which could result in minor to moderate physical injury unless it is averted.
NOTE	Material damage: the product or its environment could be damaged.

1 Indication and settings

1.1 Description

The Spider unit is a microcontroller based system, configurable to suit different application needs. It is designed to match the two or three door PEC or DU power unit also with a one door unit added. The control system can control pumps with double coil or single coil in one direction.

The unit can for PEC be mounted inside the power unit, in the power unit door, on the outside of the power unit or delivered separate with wall brackets or panel flange to be wired in by the customer. Cable sets can be supplied as an option.
The unit will for DU be mounted on the power unit side with the control panel on the outside or inside of the front door communicating via CAN.

The front panel of the Spider includes a set of buttons for set up, and a set for drive control (one set/drive).The configuration of the pre-programmed system functions is done using the front panel with help from the text displays or via a serial connection from a laptop. The configuration mode can be protected with a password.

The system includes a drive monitoring function with drive time counters, alarm/warning list and 8 scalable log channels with data download via serial interface.

The Spider unit can control the system with different settings of electric motor/pump configuration.

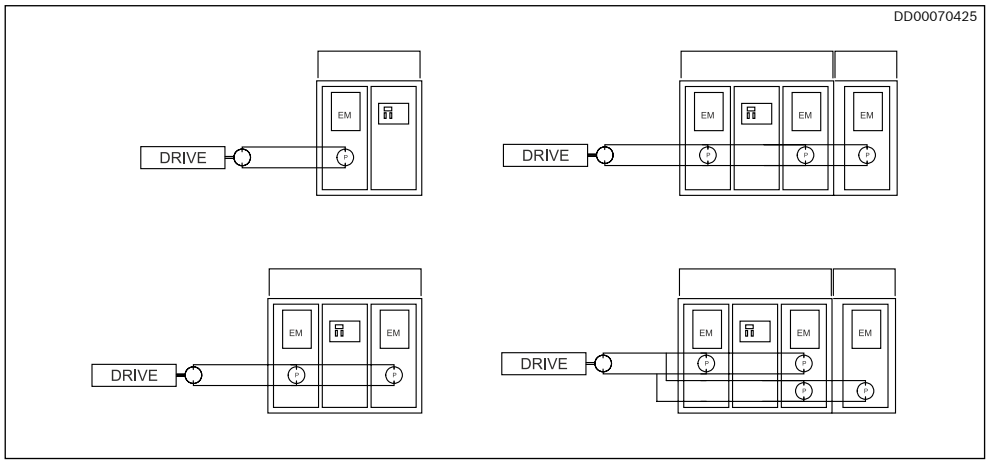


Fig. 1: One to four pumps for one drive

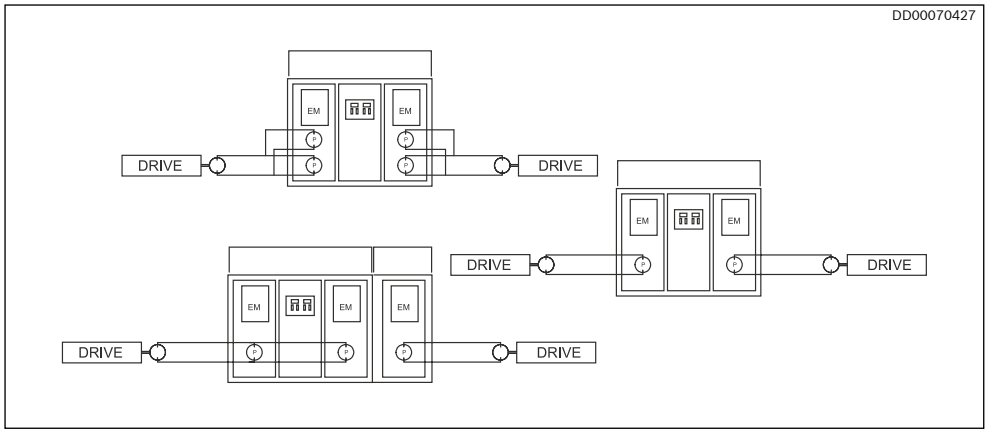


Fig. 2: Two to four pumps for two drives with separate function

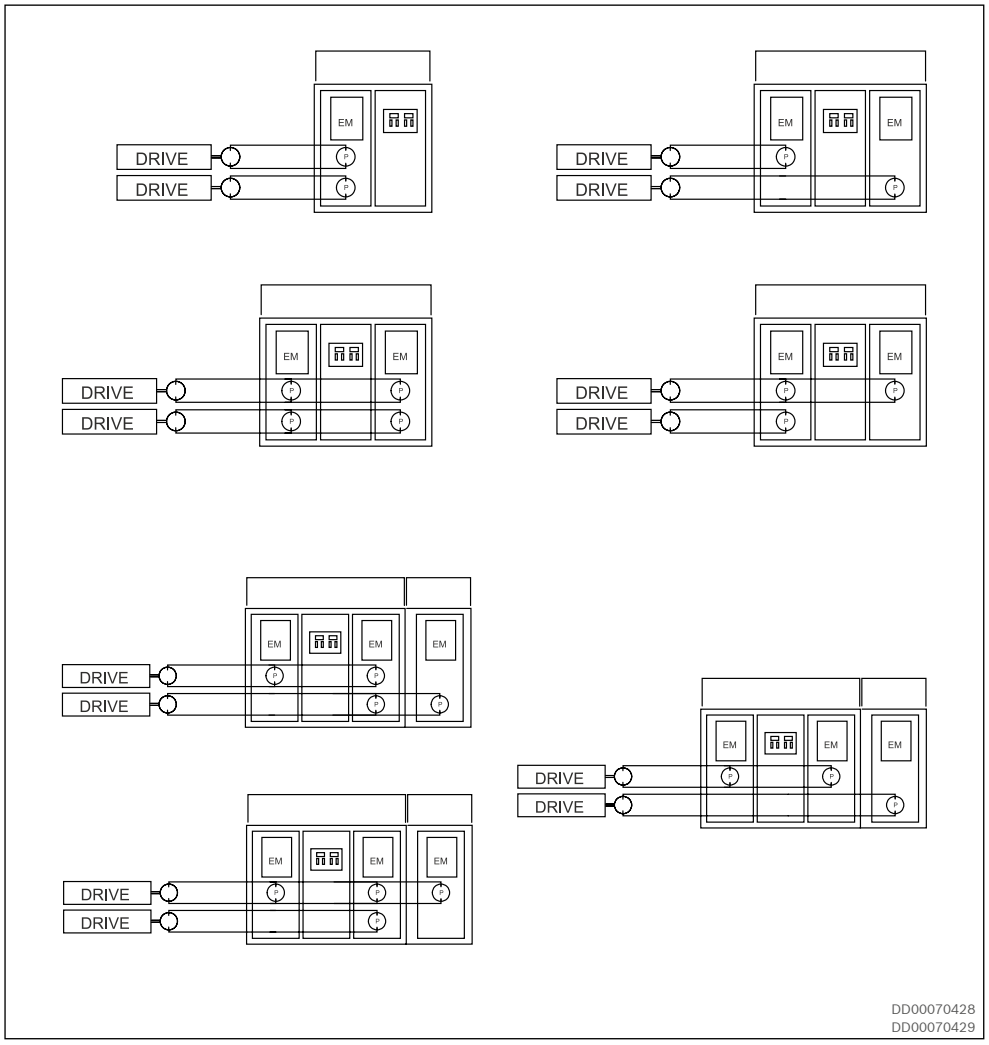
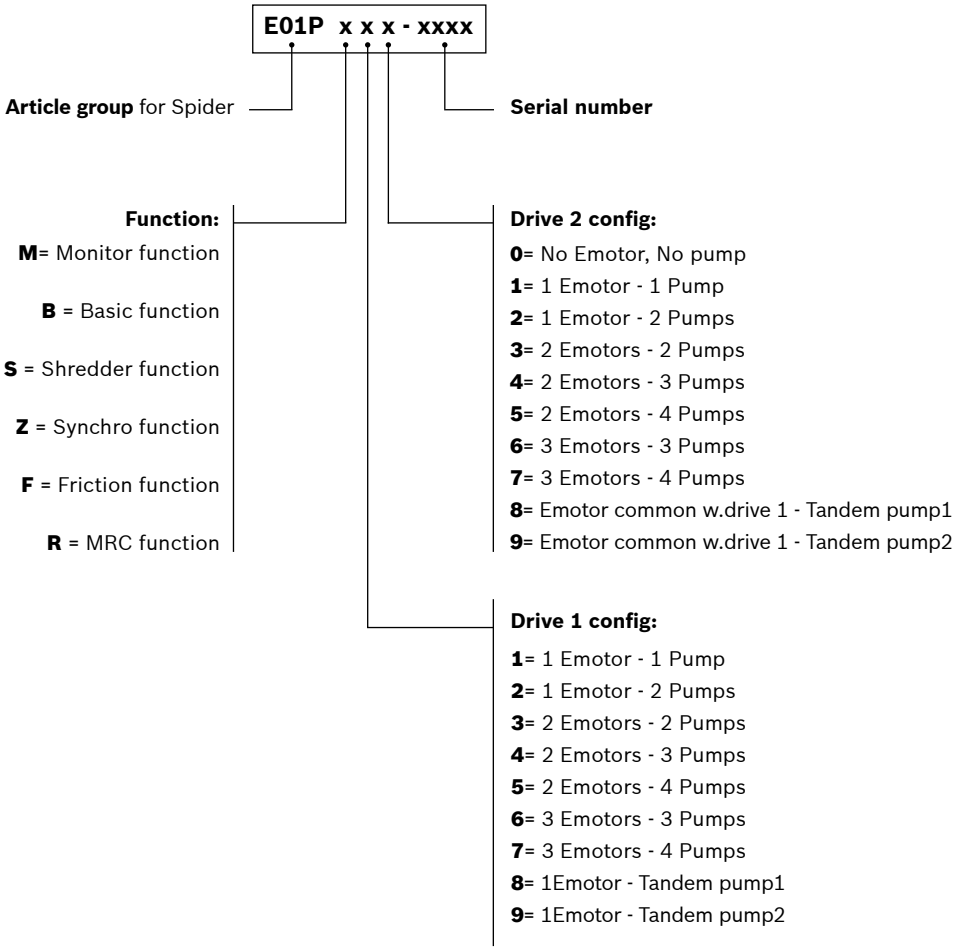


Fig. 3: Two to four pumps for two drives with common function.
If one stops by a fault the other will also.

1.2 Serial number

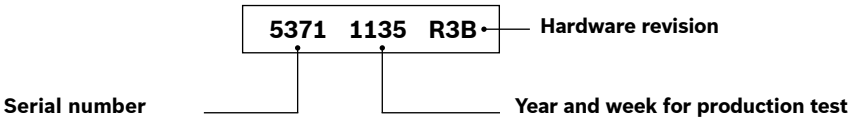
This serial number system is used up to Serial number -4653.



Serial number after -4653 is Cxxxxx without any correlation to the function. C is standing for Controls but the following number is used for all types of different control equipment.

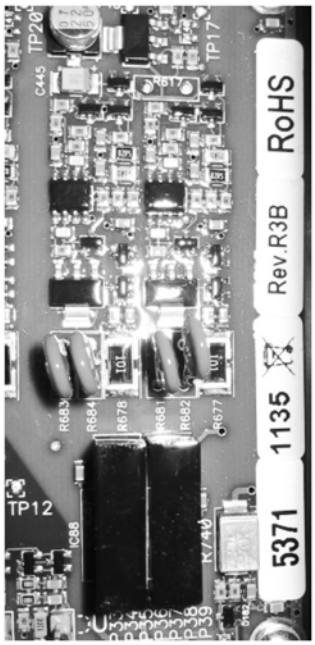
1.3 Card number

The serial card number is marked on the card at final test. The number consists of an serial number and year and week for the production test. The hardware revision marking is adjacent to the card number



Example:

DD00070841



Layout Rev A

Layout Rev B

1.4 Ordering code

In order to identify Hägglunds equipment exactly, the following ordering code is used. These ordering codes should be stated in full in all correspondence e.g. when ordering spare parts. Example Spider2:

B	1	0	1	–	0	0	0	0	0	–	1	–	0	0
01	02	03	04		05	06	07	08	09		10		11	12

01	**Function**		
	Monitor	Driver and functions for monitoring of power unit	**M**
	Basic	Monitor with added functions for Speed feedback and power limitations	**B**
	Shredder	Basic with added functions for shredder drives	**S**
	Synchro	Basic with added functions for synchronization between two drives	**Z**
	Friction	Basic with added function for friction control between two drives.	**F**
	MRC	Basic with added functions for synchronization and friction between two drives	**R**

02	**Drive 1 configuration**	
	1 el. motor - 1 pump	**1**
	1 el. motor - 2 pumps	**2**
	2 el. motors - 2 pumps	**3**
	2 el. motors - 3 pumps	**4**
	2 el. motors - 4 pumps	**5**
	3 el. motors - 3 pumps	**6**
	3 el. motors - 4 pumps	**7**
	1 el. motor - Tandem pump 1	**8**
	1 el. motor - Tandem pump 2	**9**

03	**Drive 2 configuration**	
	No el.motor - 1 pump	**0**
	1 el. motor - 1 pump	**1**
	1 el. motor - 2 pumps	**2**
	2 el. motors - 2 pumps	**3**
	2 el. motors - 3 pumps	**4**
	2 el. motors - 4 pumps	**5**
	3 el. motors - 3 pumps	**6**
	3 el. motors - 4 pumps	**7**
	El. motor 1 - Tandem pump 1	**8**
	El. motor 1 - Tandem pump 2	**9**

04	**Assembling alternative**	
	Loose item with brackets excl. cables	**1**
	Loose item with flange excl. cables	**2**
	Mounted inside PU	**4**
	Mounted on PU door	**5**
	Mounted on PU door	**6**
	Mounted on side of PU	**7**
	Loose item for DU drive unit, incl. separate control panel for outside tank door, excl. cables	**A**
	Loose item for DU drive unit, incl. separate control panel for inside tank door, excl. cables	**B**
	Loose item for DU drive unit, incl. separate control panel for remote mounting, excl. cables	**C**

05	**Display**	
	LCD type (standard)	**0**
	VFD type (required for chinese characters)	**1**

06	**Heater**	
	None	**0**
	Installed in Spider box	**1**

07	**Fieldbus card**	
	None	**0**
	Profibus	**1**
	Modbus RTU	**2**
	ControlNet	**3**
	Ethernet	**4**
	Profinet	**6**
	DeviceNet	**7**
	Modbus TCP	**8**
	CC-link	**9**

08	**Not used**	
	None	**0**

09	**Pressue control**	
	None	**0**
	Pressure control Drive 1	**1**
	Pressure control Drive 2	**2**
	Pressure control both drives	**3**

10	**Power supply**	
	External 24 VDC	**0**
	Internal 250 W (standard)	**1**

11	**Potentiometer**	
	None	**0**
	Installed in Spider box	**1**

12	**Plexiglas window**	
	None	**0**
	Assembled	**1**

2 Display and Buttons

2.1 Display information

Spider can be equipped with keypads and display for one or two drives. A Spider unit for one drive has one set of display and drive buttons. A Spider unit for two drives has two sets. All units have one set of set up buttons (arrows and enter button). From main card rev R3A it is possible to place the displays and keypads as a Local interface unit (Spider control panel) separated from the Spider control unit.
For a double display unit the positions of Drive 1 and Drive 2 can be switched.

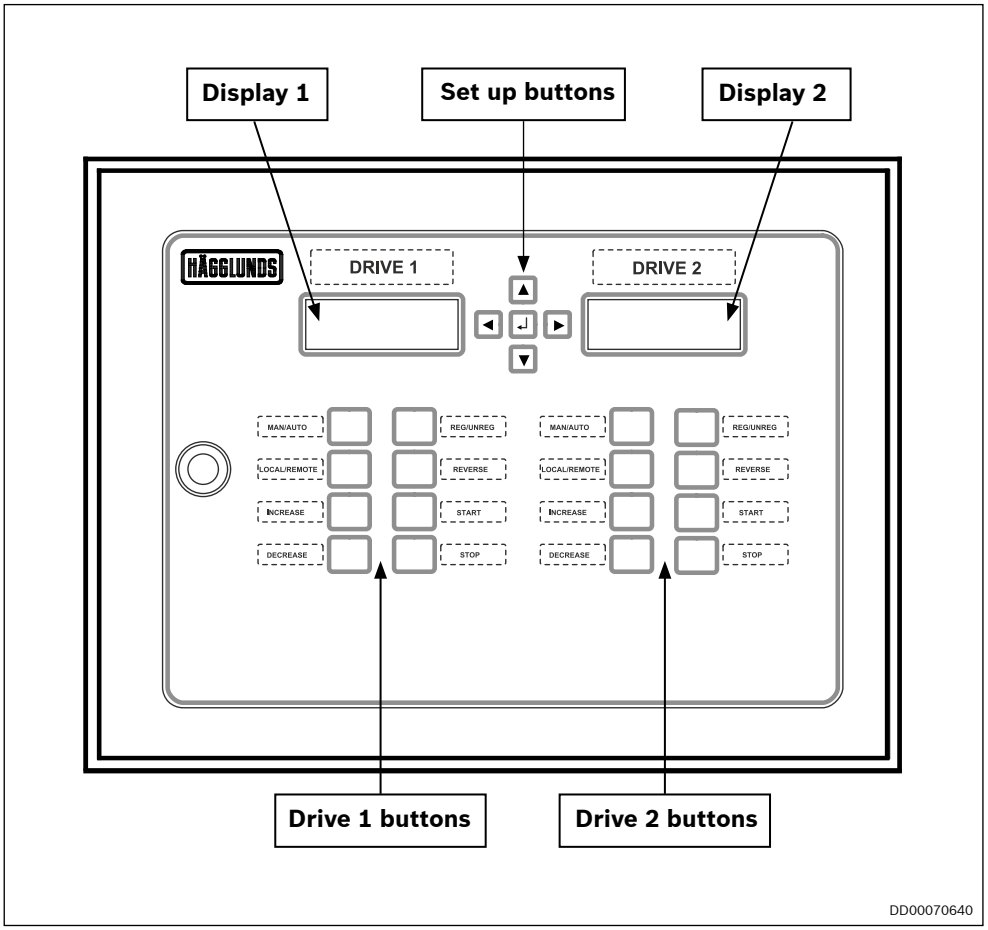


Fig. 4: Front panel

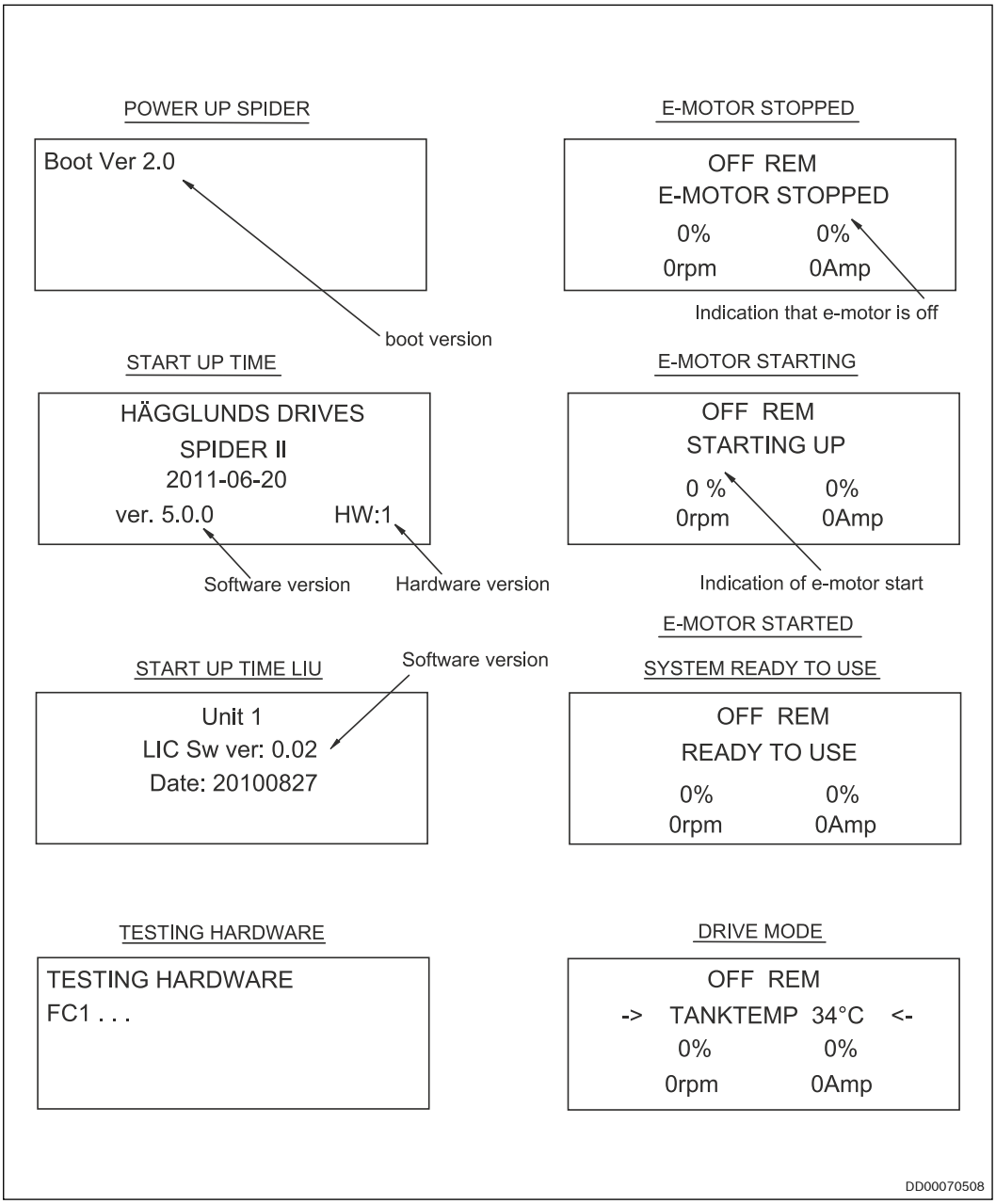


Fig. 5: Display text examples

2.2 Information on normal drive and alarms

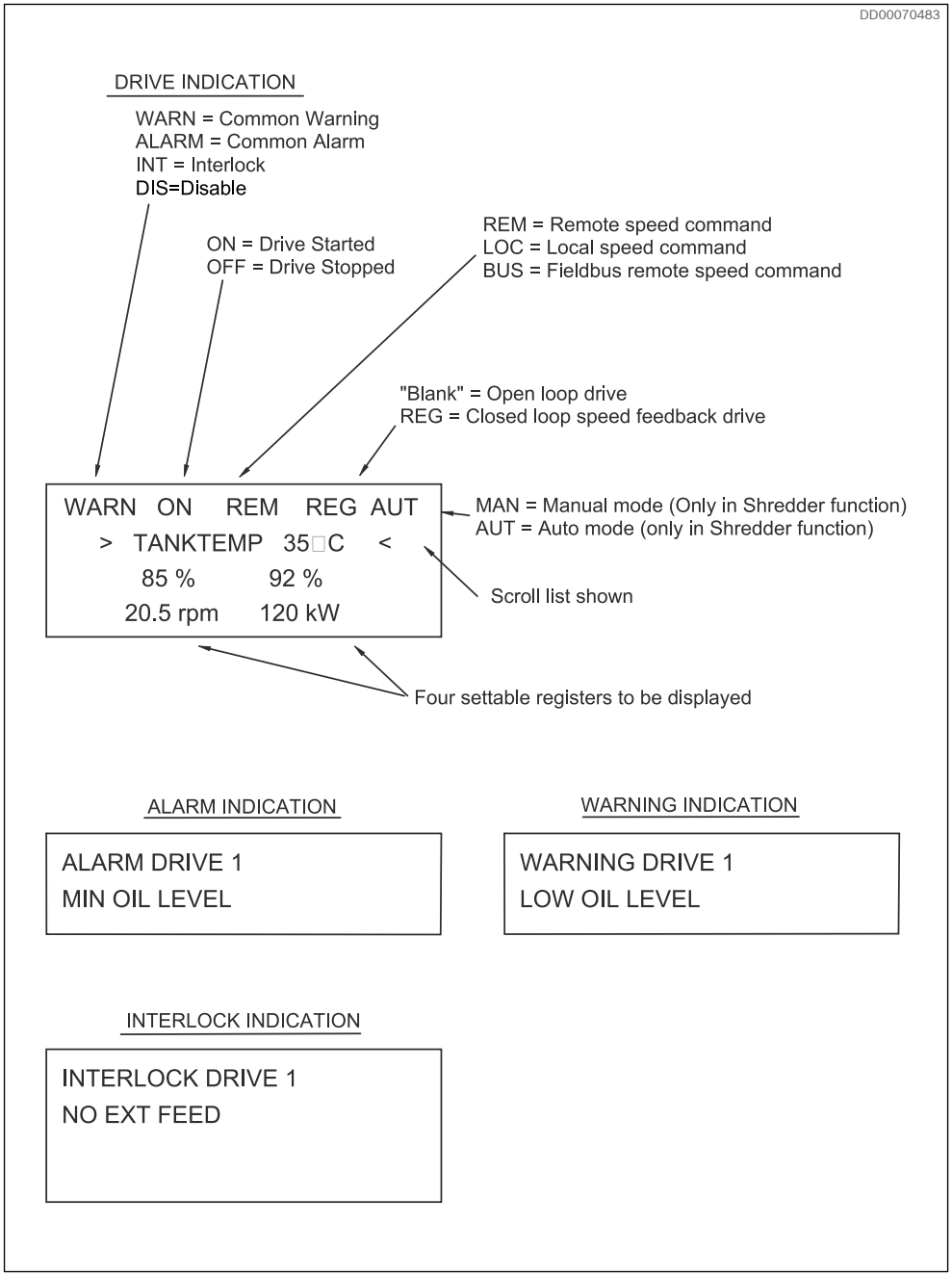


Fig. 6: Normal drive and alarms

2.3 Reset of alarms and warnings

To enter the list of alarms, warnings and interlocks press an arrow button (◄►) for 3 sec. If the current Spider has two displays press left arrow to enter list for drive 1, right arrow for drive 2. A common alarm/warning can be seen on both the displays.

The alarms and warnings are showed one and one. If there are several notifications scroll with up and down arrows (▼▲) to see all messages in the list.

To reset a notification go into the alarm/warning list and press the Enter button after the reason for the indication is fixed.
When there is “NO MORE ALARMS OR WARNINGS” push left or right arrow button (◄►) to return to main menu.

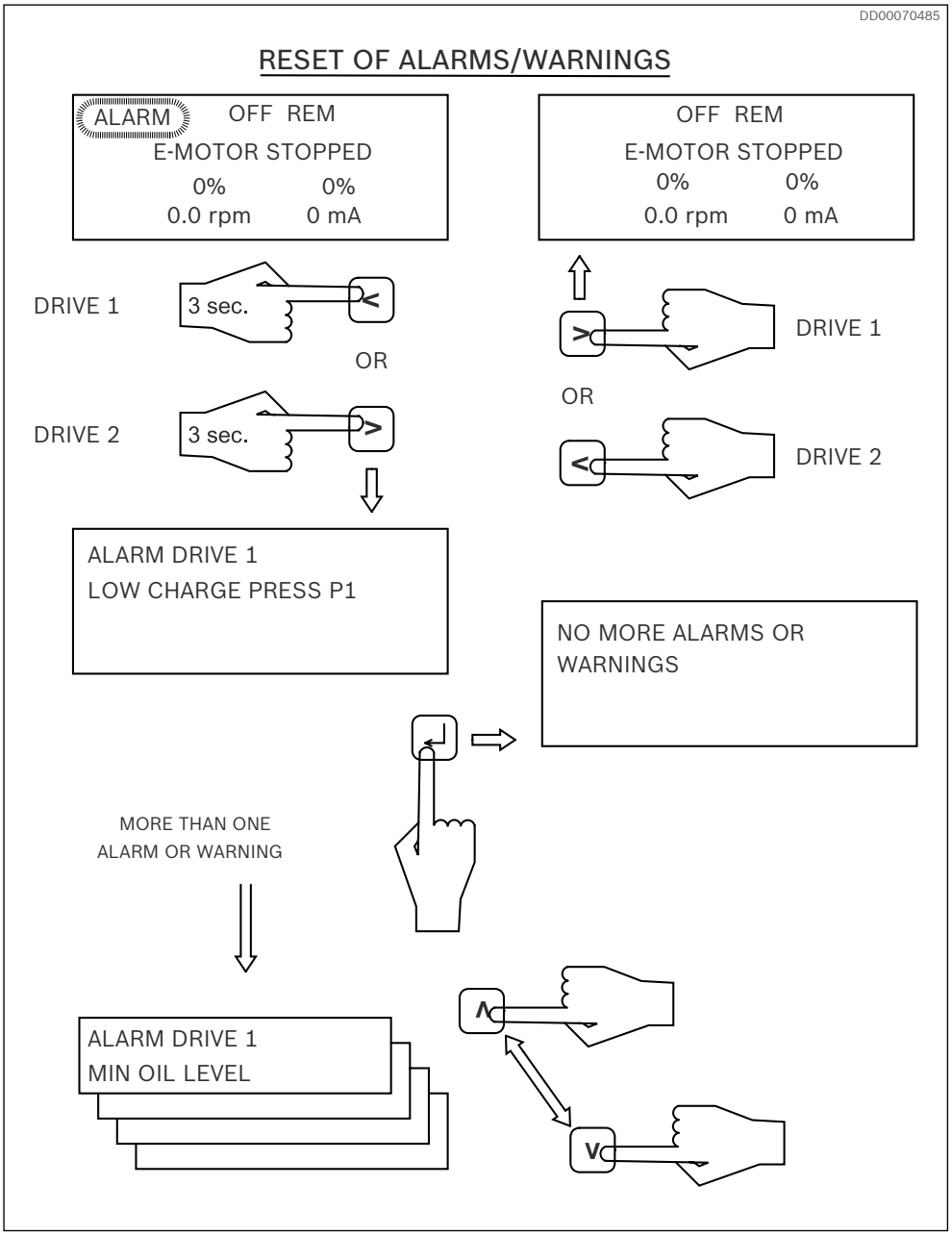


Fig. 7: Normal drive and alarms

2.4 Front panel buttons

2.4.1 Set up buttons

↵	Go down one level in display menu. Accept a change in parameter. Reset alarm, Warning or interlock.
<	Go up one level in display menu. Escape without change of parameter. Select Drive 1 scroll list (short time press). Select Drive 1 alarm list (Press for 3 sec).
>	Select Drive 2 scroll list (short time press). Select Drive 2 alarm list (Press for 3 secs).
^	Scroll up display menu. Go to next alarm/warning. Increase parameter.
v	Scroll down display menu. Go to previous alarm/warning. Decrease parameter.
< + ↵	Press 3 sec. to enter setup list.
^ + ↵	Increase contrast on display
v + ↵	Decrease contrast on display

2.4.2 Drive buttons

MAN/AUTO	Switching between manual and auto drive mode. (Only available in Shredder function)
LOCAL/ REMOTE	Switching between front panel and external setpoint/ start-stop if this function is selected.
INCREASE	Increase speed setpoint when driving in local mode (front panel setpoint).
DECREASE	Decrease speed setpoint when driving in local mode (front panel setpoint).
FORWARD (Same button)	Manual forward in Shredder function.
REG/ UNREG (Same button)	Switching between open and closed loop speed control when speed feedback used. (not available in shredder function).
REVERSE	Inch reverse with fixed speed. Manual reverse in Sheredder function.
START	Start of drive.
STOP	Stop of drive.
💡	Toggling of relay output for DU internal light.

DD00070491

2.5 Error Codes

2.5.1 Program start

WARNING EEPROM READING FAILED
This error message indicates that the Spider software can‘t read saved parameter values from the memory card. This error can occur if : No memory card connected, memory card defect or wrongly mounted or the information on the memory card is corrupt. Spider software will start with default values on parameters.

WARNING WRONG EEPROM VERSION
This error message indicates that the Spider software can‘t use the parameter values that‘s stored on the memory card because the parameter format stored on the memory card not is compatible with the Spider software used. Spider software will start with default values on parameters.

WARNING WRONG CPLD VERSION
This error message indicates that the Spider software version used not is compatible with the software version in the CPLD (Complex Programmable Logic Device). The CPLD is used for digital in and outputs, counters, display and Anybus. The Spider will work in an unpredictable way.

WARNING LOG INIT ERROR
This error message indicates that the Spider software can‘t read the real time clock, saved alarms, warnings, drive times or setpoints from the memory card. These functions will not work.
This error can occur if no memory card is connected, memory card is defect or wrongly mounted or the information on the memory card is corrupt.
The information will also show with a system where the parameters not have been set (first power-on).

WARNING 3D-LOG INIT ERROR
This error message indicates that the Spider software can‘t read the 3D-log on the memory card. The 3D -log function will not function. This error can occur if no memory card is connected, memory card is defect or wrongly mounted or the information on the memory card is corrupt.
The information will also show with a system where the parameters not have been set (first power-on).

WARNING NO SERIAL NUMBER
This error message indicates that the system serial number not is set with parameter NUM under Log function – Serial number. This number is used in naming of the parameter file from SpiderCom.

WARNING NON COMPATIBLE MEM-C
This error message indicates that the system can’t read the memory card.
The memory card is not connected, is of wrong type or is faulty.

WARNING COMMUNICATION TO LIC
This error message indicates that the system can’t communicate with the Spider control panel card.

2.5.2 Hardware monitoring

HW ERROR, FC 1
This test is to verify that the delay for electric motor interlock set in hardware with SW1 matches the
delay set in the Spider parameters (for electric motor interlock). If emergency stop is actuated the relays in the hardware will open after set time 2-32 sec. (in 2 sec. steps). If this test not performes within the
below shown limits, the error message ”HW ERROR, FC 1” will be displayed.
The test is performed upon system start up.

HW delay < SW delay	software stops
HW delay > SW delay + 4 s	Only warning, press a button for OK
HW delay > SW delay + 5	Software stops

When the software stops both Hardware(M) time and Software(S) time is displayed in 1/10 sec so that the times can be verified/corrected.

HW ERROR, FC 2
This test is to verify that the relay that feeds the PWM-outputs opens. If emergency stop is actuated
the Spider hardware for emergency stop open this relay. This test is performed when all e-motors are
stopped. If the relay doesn‘t open on this test, error message ”HW ERROR, FC 2” is displayed and
the software stops.

HW ERROR, FC 3
This test is to verify that the electric motor interlock relays opens. When electric motor interlock is
OK the relay is closed and open when interlock not is OK. If the relay not opens, error message ”HW ERROR, FC 3” is displayed and the software stops. This test is performed at power on and once when all electric motors are stopped.

HW ERROR, FC 4
Watchdog indication should not be achieved during normal program execution. If it happens during normal program execution, error message ”HW ERROR, FC 4” is displayed and the software stops. This test is performed continuosly.

HW ERROR, FC 5
If measured current is 50% greater than max configured current a shortcircuit is assumed,
error message ”HW ERROR, FC 5” is displayed and the software stops. This test is performed continuosly.

2.5.3 Software monitoring

WATCHDOG TIMEOUT
If the software halts or executes incorrect in that way that the control loop or the user interface loop
can‘t execute within set time limits, error message ”WATCHDOG TIMEOUT” is displayed and the software stops. Program address where the execution stopped is also displayed.

OUTPUT ERROR Px
If the measured pump current deviates more then the setting in parameter PMx13 from the procentual value of the set current between min and max current (Pox01-04) the output will be cut off. Function can be bypassed with parameter PMx12 set off.

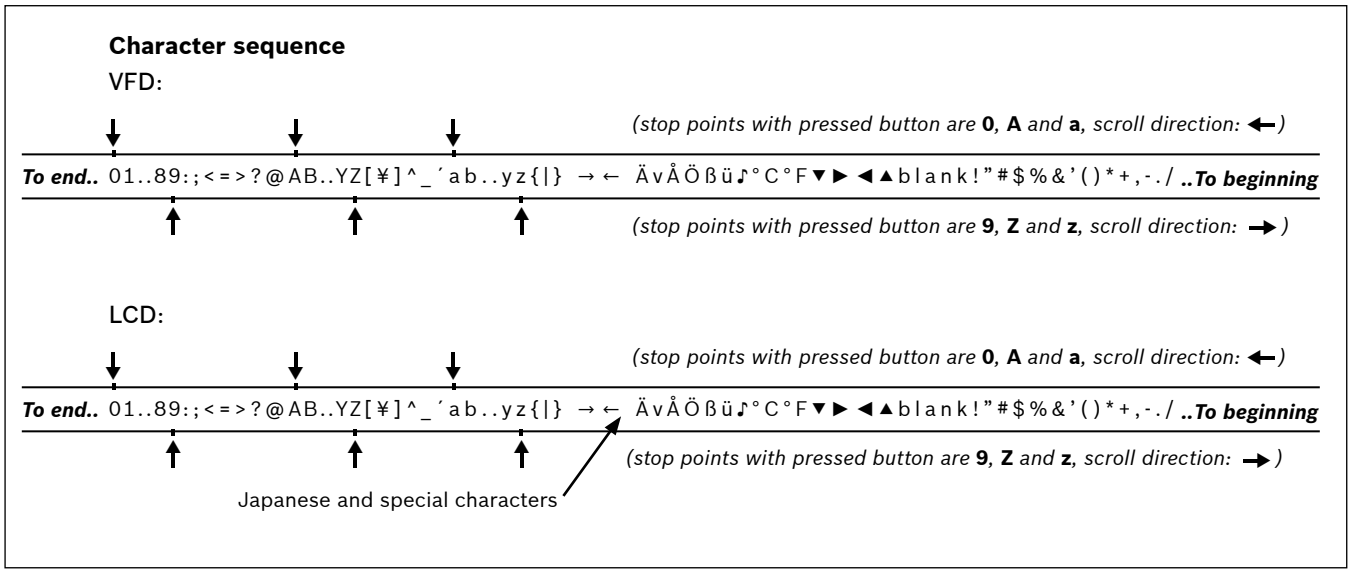
2.5.4 Bus

BUS FAIL
Anybus function is selected but the communication does not function. This error is likely to occur if the bus cable not is connected.

BUS HW FAIL
Anybus function is selected but the hardware is not functioning. This error is likely to occur if the bus module is missing or defect.

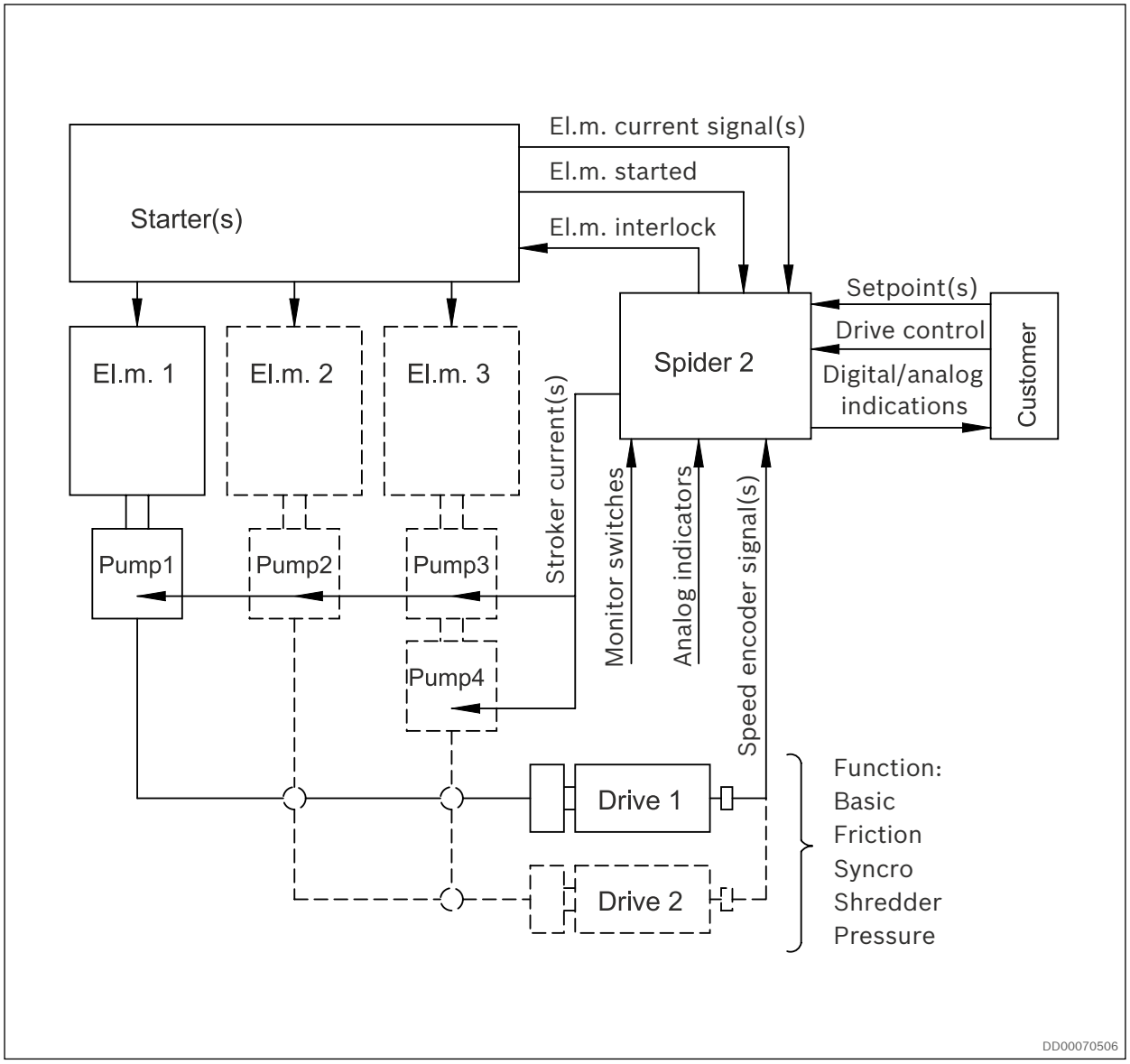
2.6 Text settings

Indicating texts in Aux functions, AMx04 can be set via front panel or SpiderCom. Serial number in drive log must be set via front panel.
The text characters are scrolled with ▲ or ▼ buttons and selected with Enter button at the front panel. If the button tapped the characters will change one character at the time. If it is pressed during scroll the character will stopped at fixed positions.



3 General function

3.1 Block diagram in- and outputs



3.2 Drive controls

The drive control buttons on the front panel are for start and stop of the drive, local/ remote, speed set point by increase and decrease in local mode, inch reverse, regulated/ non-regulated drive and auto/manual drive in shredder mode. These push-button functions can be bypassed in the configuration of the system functions.
All above-mentioned functions can also be activated by remote signals (in addition to a lot of other signals that can be activated remotely).

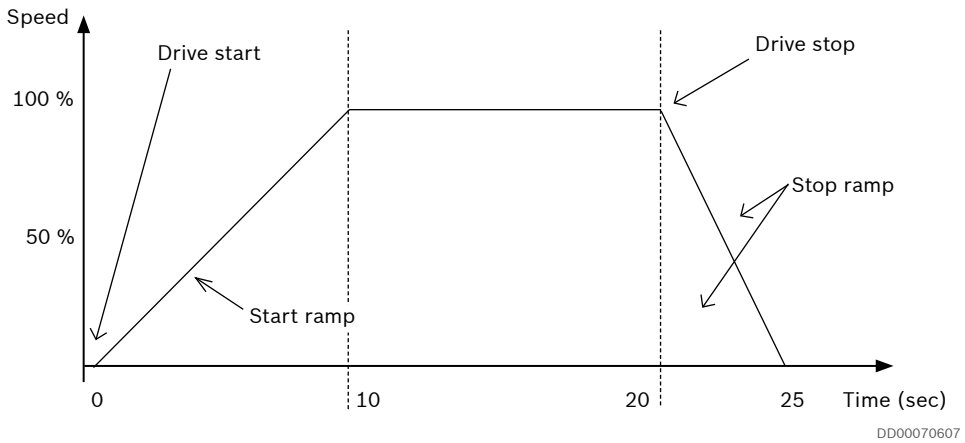
3.3 Speed Command

The speed set point command can be the local command or a remote command signal. The local command is set with the increase and decrease buttons on the front (or externally via digital inputs for increase/decrease).
Remote set point command is a voltage or current signal connected to the terminals (the type is set with a parameter and with jumper SP D1(2).) Remote set point can also be set via fieldbus (optional).
The speed command can be locked to local or remote control or be switchable with the local/remote button (or via digital input).
At local/remote switching the local set point command can either remain or automatically (or by a digital input) be set to zero (depends on the parameter settings).
Local increase/decrease will not affect the local set point when running in remote mode.

3.4 Ramp

The start ramp time is the time it takes for the signal to control the hydraulic pump, to go from zero to 100% if the speed set point is 100% and drive start is activated. The stop ramp is the time it takes to go from 100% to zero when drive stop is activated. Drive start and stop are ramped commands (as well as fixed forward, fixed reverse and inch reverse). The start ramp is controlled by separate parameters in forward direction and reverse direction. The stop ramp is controlled by separate parameters forward direction and reverse direction.

Example: If the ”up ramp” is set to 10 sec. and the down ramp is set to 5 sec. we will get the following output. The example is based on 50 and 100% set point



3.5 Stroker current output

There are two output channels for each pump (one for forward and one for reverse), with individual settings.
The outputs are Pulse Width Modulated and the PWM frequency is set in acc. with used stroker. This means the Spider can control pumps with double coil, or single coil in one direction.

Coil resistance
The system will measure the current in the stroker coil and compensate for the resistance change due to increased temperature.
The nominal resistance of used stroker coil is set with a parameter.
A typical resistance value is:

HD	41 Ω
SP	20 Ω
KA (Sauer)	20 Ω

3.6 Digital outputs/inputs

3.6.1 Electric motor interlock outputs

There are 3 normally high off delayed digital outputs for interlock of the electric motors (shall be connected via a relay in the electric motor stop circuit). Each output is high when it is allowed (no alarms) to run corresponding electric motor, and will go low (open) time-delayed after an Alarm.
The delay time is set with an individual parameter for each output.

The normal stop sequence at alarm:
1. The output to the pump is set to zero without ramp.
2. After a time delay (adjustable) the electric motor interlock is opened.

The output relays are monitored to detect faulty relay contacts. At system power-up and when all e-motors are stopped, the relays will be tested if the emergency stop input not is open. To avoid faulty alarms from the relays, they will be switched on and off 5 times to remove oxidation from the contacts before the test.

3.6.2 Digital outputs

There are 13 digital outputs that can be used to monitor the status of Alarm, Warning or Interlock, or of a digital input.

3.6.3 Functions for monitoring

The monitoring function is available in all setups.
There are 43 digital inputs in total. The pre-programmed functions can be used for drive control and monitoring function with 4 different types of indication:
Warning = indication on the display (and by a digital output if this function is set).
Alarm = indication on the display (and by a digital output if this function is set).

This function will stop the drive without ramp and after a short delay open the electric motor interlock output to stop the motor (see „Electric motor interlock outputs“ above).
Interlock = same as alarm but without stopping the electric motor.
Disable = same as alarm but without indication in the drive log.

The Warning, Alarm and Interlock indications must be reset in the Alarm/Warning list after the reason for the indication is fixed (see 2.5 Front panel buttons). Disable don’t need to be reset.

3.7 Speed feedback

3.7.1 General

Speed feedback requires a speed encoder, digital or analogue (4-20 mA) and makes it possible to maintain a constant speed at the hydraulic motor shaft. The Spider compensates for speed deviations due to load changes. To achieve this, a PID regulator is implemented in the software. This PID regulator compares the actual speed value with the speed set-point. Any deviation between the two signals is detected as an Error signal and transferred to the PID regulator.
The proportional part amplifies the Error signal. The Output is proportional to the Error signal.
The Integral stage integrates the Error signal. A small Error signal will over time create a big Integral stage output.
Derivative stage derives the Error signal. A rapid change will create a big output from the derivative stage.
The results from the three different stages are added to the stroker output.

The use of PI only is most common.
A system set up with speed feedback (regulated drive) can be switched between regulated and unregulated mode, by means of panel button „REG/UNREG“ (or by a remote signal).
Note: In case the difference between the set point and the actual speed is bigger than a pre-set value and remains so for >10 sec. the drive will automatically be set to unregulated mode (but it will keep on running), and „ERROR TO LARGE“, will be displayed (a digital output will indicate as well, if set).

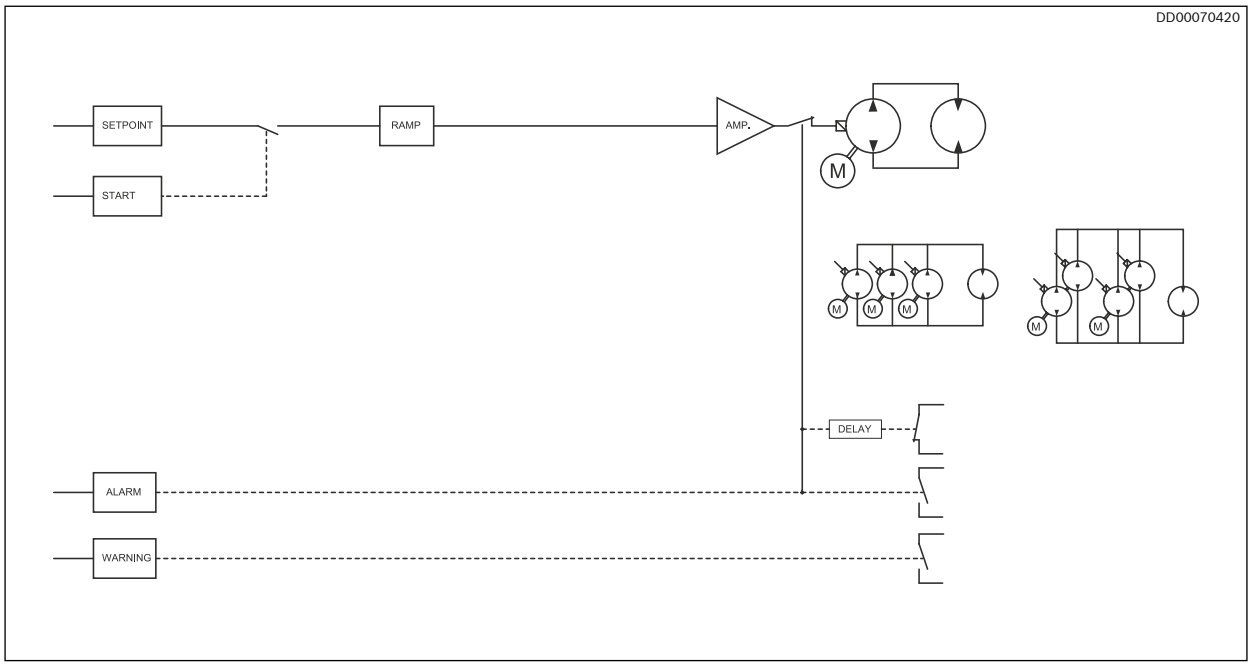
3.8 Power limitation

Power limitation function is not available in the monitor type spider, basic function or higher is needed. Power limitation requires an analog input signal (voltage or current loop signal) from a current transformer that senses the current of the specific electric motor.

If the current consumption of the electric motor exceeds pre-set limitation value, the output current to the stroker will ramp down (towards zero) until the current consumption of the electric motor decreases below set limitation value which will make the output current to the stroker to ramp up, back to previous value.

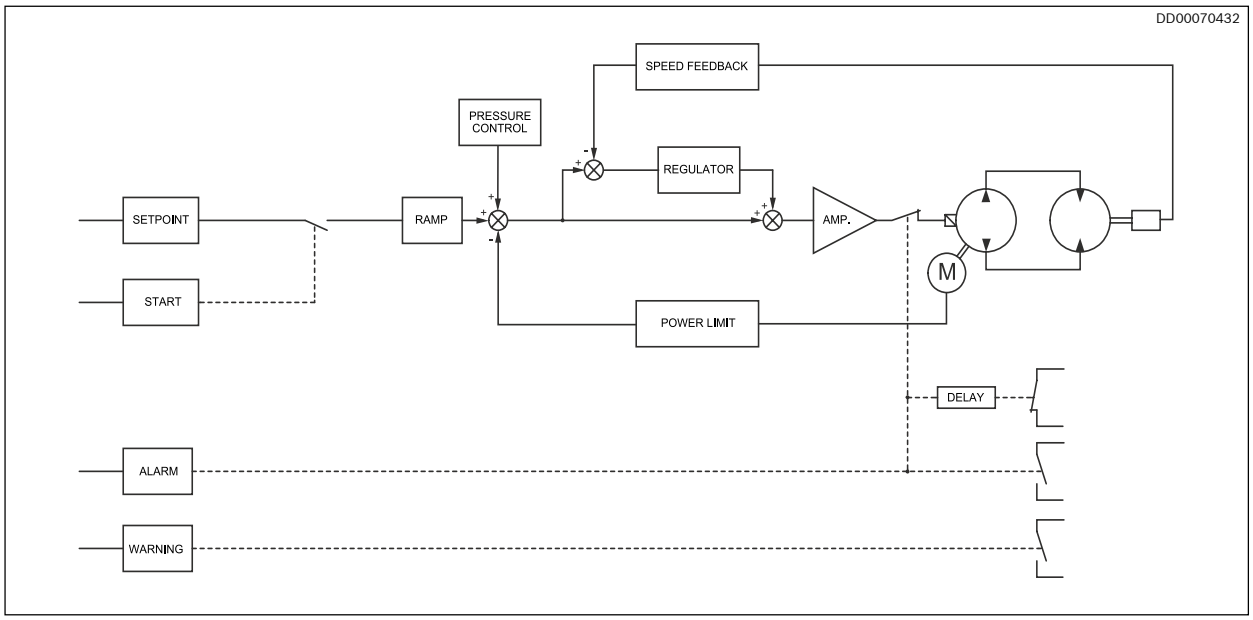
3.9 Monitoring

The Monitor function health monitors the power unit switches and shows information on the text display about warnings or alarms. An alarm will stop the drive (de-stroke the pump) instantly and after a time delay stop the electric motors via the digital interlock output which must be connected to the starter interlock circuit via a relay. Up to 4 pumps can be controlled in parallel for the same drive.



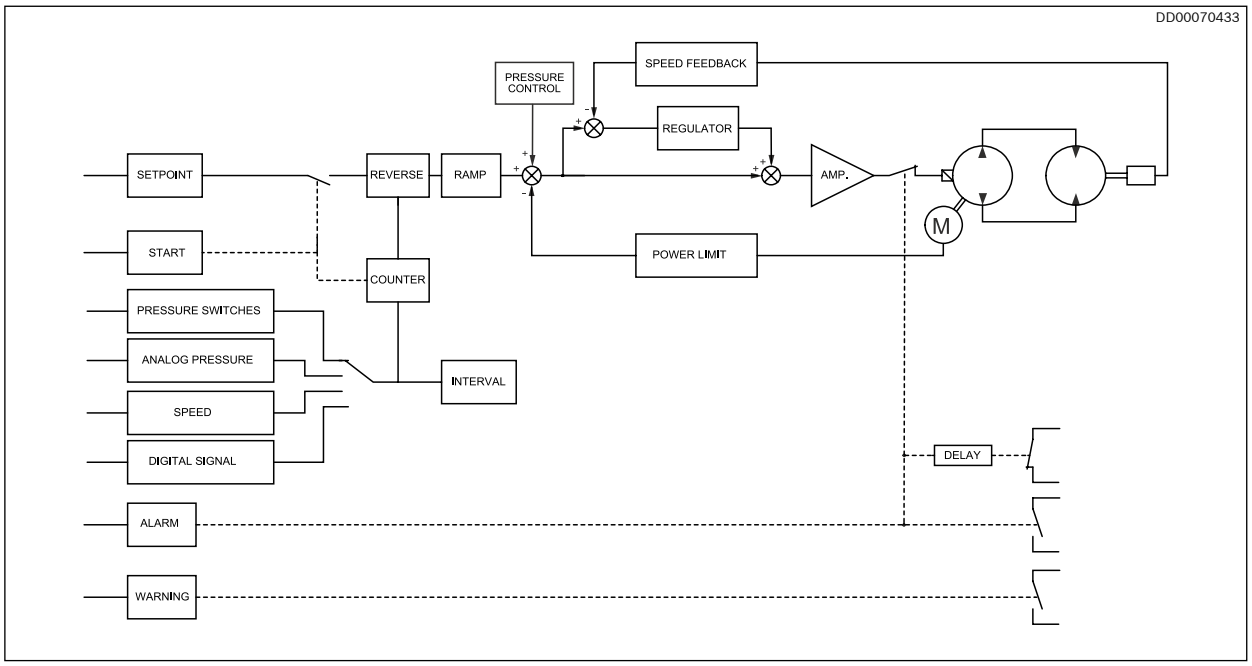
3.10 Basic

The Basic function has added functions for power limitation and closed loop speed feedback via a PID-regulator. Inputs are available for analog or digital speed encoders. The unit can also monitor analog signals on the display such as speed, E-motor current, pressure etc.



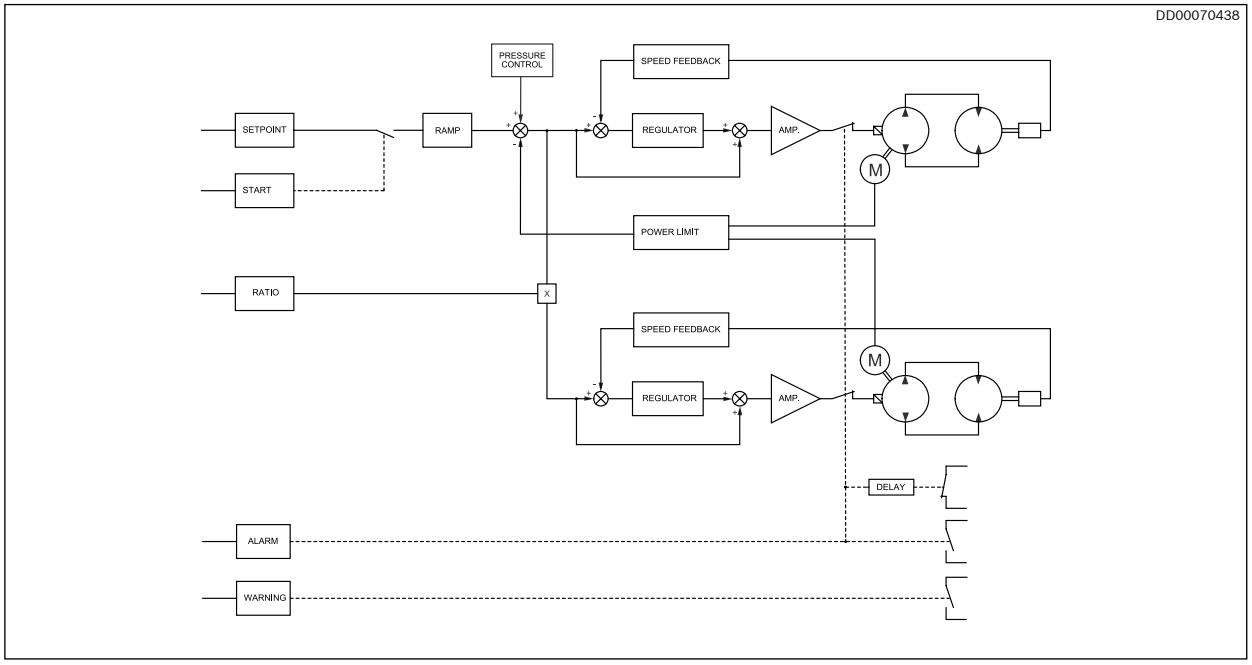
3.11 Shredder

The Shredder function has the same functions as Basic and with added functions for reversing by an overload-stopped drive. It is possible to maximise the number of reversals within a time limit and stop the drive when exceeded. The drive can be set to change direction after an adjustable time interval.



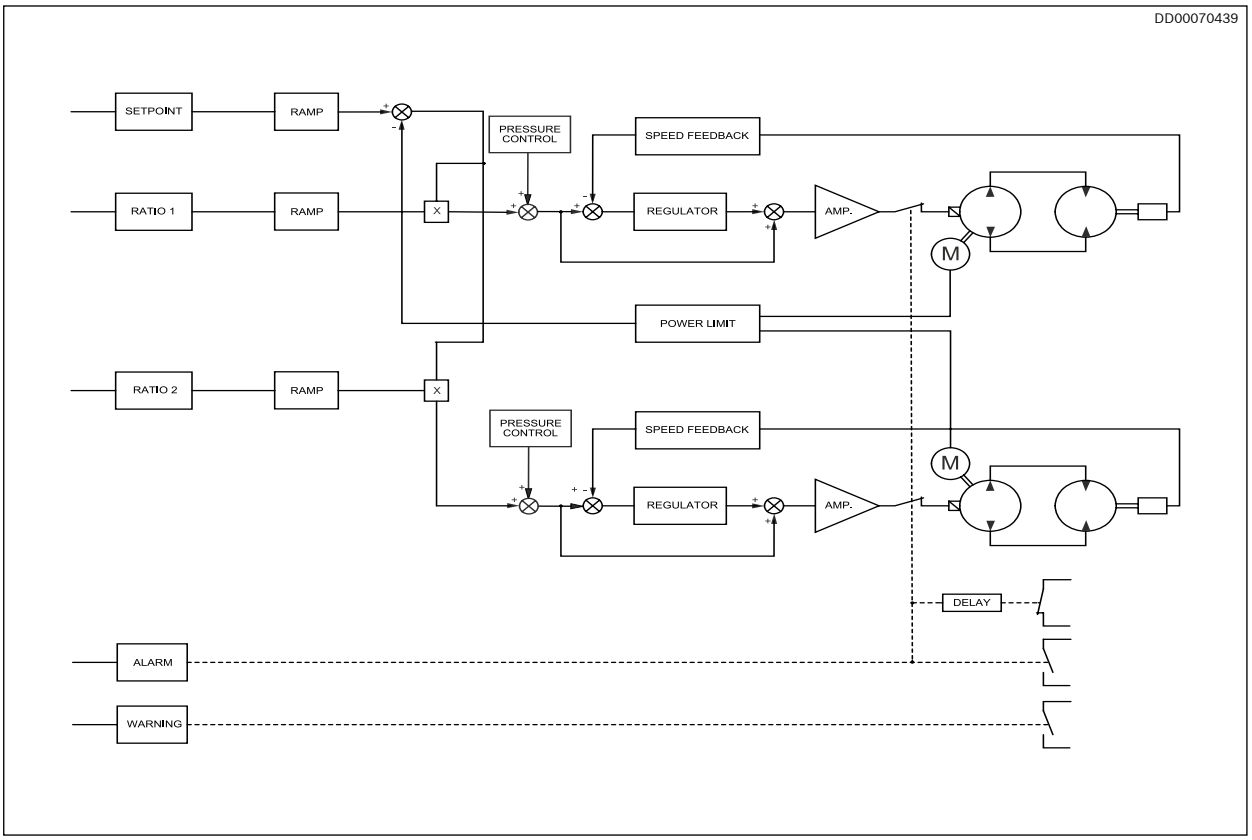
3.12 Friction

The Friction function has the same functions as Basic and with added functions for control of two hydraulic drives driven together with a ratio between the motors.



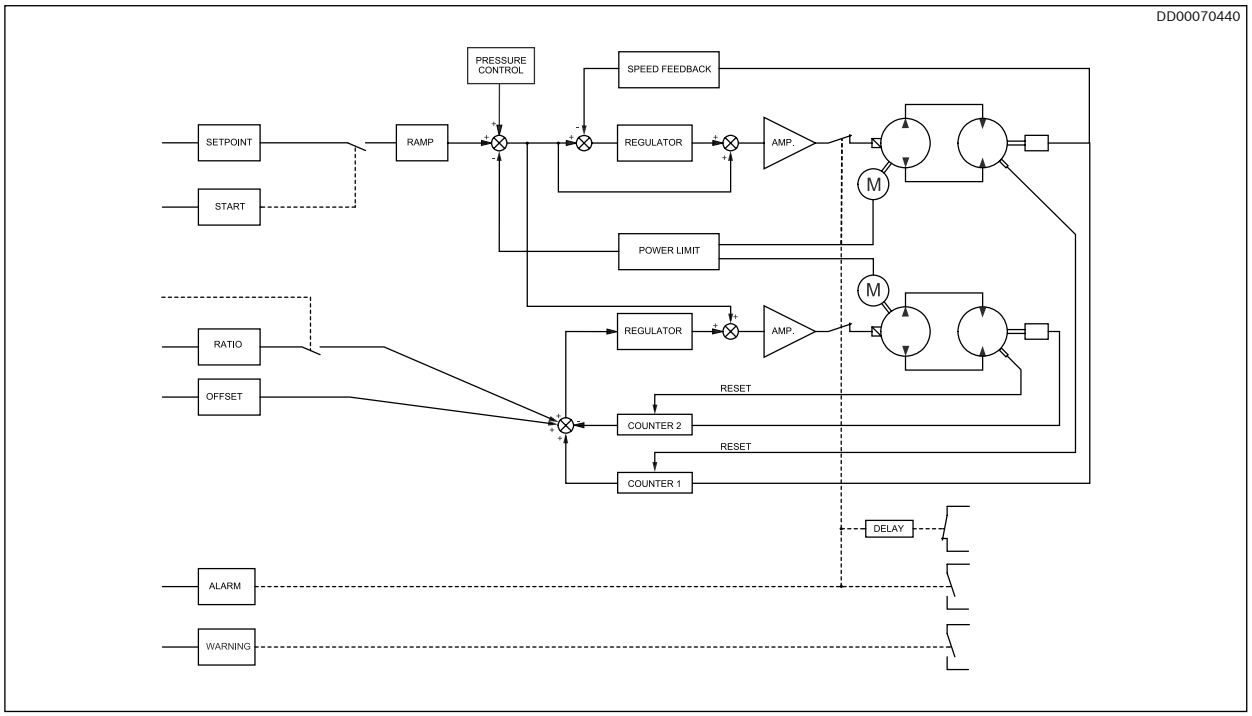
3.13 Friction slave

The Friction slave function has the same functions as Basic and with added functions for control of two hydraulic drives driven together with a ratio in relation to the master set point.



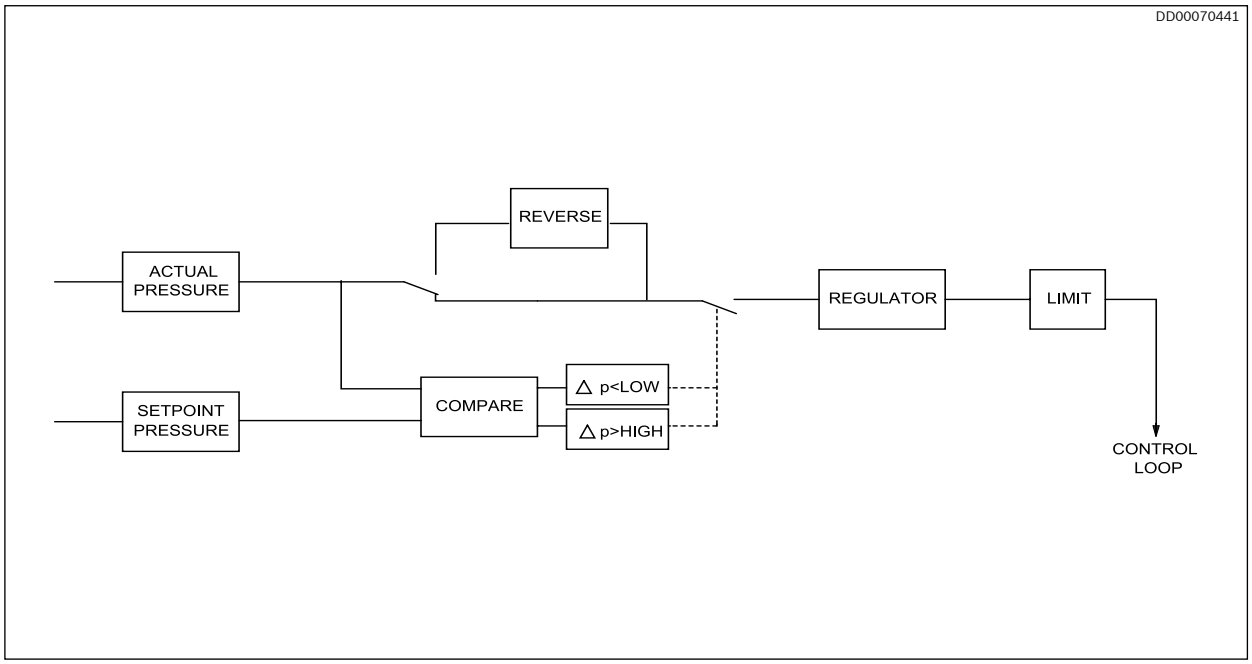
3.14 Synchro

The Synchro function has the same functions as Basic and with added functions for position control between two hydraulic drives. It is possible by an external signal to set the angle between the rolls. Ratio drive is also possible. This mode requires digital speed encoders



3.15 Pressure control

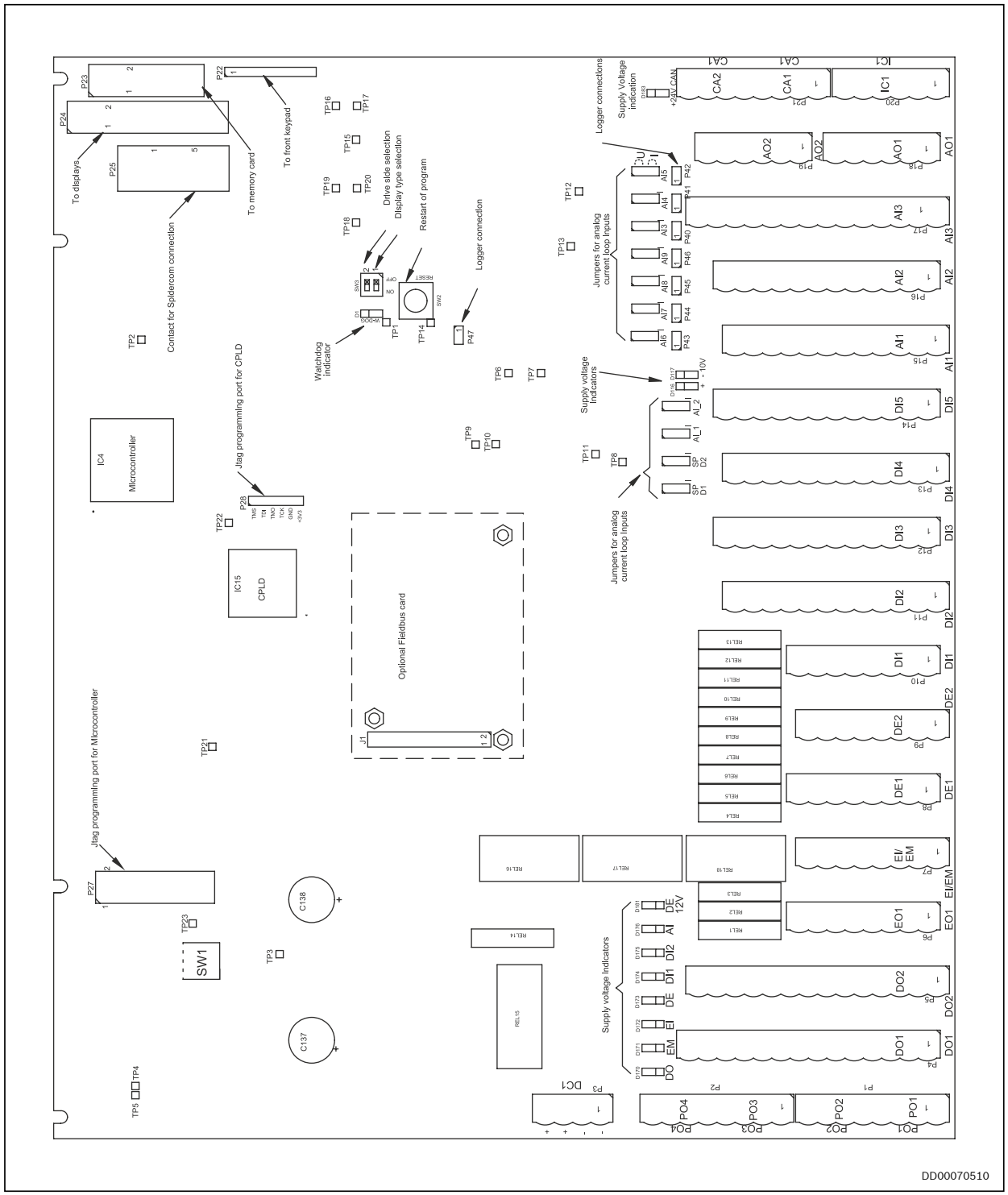
The pressure control function output is added to the ramped flow command. The function compares actual pressure to a set pressure and gives a positive or negative output depending on sign of the difference and action direction of regulation.



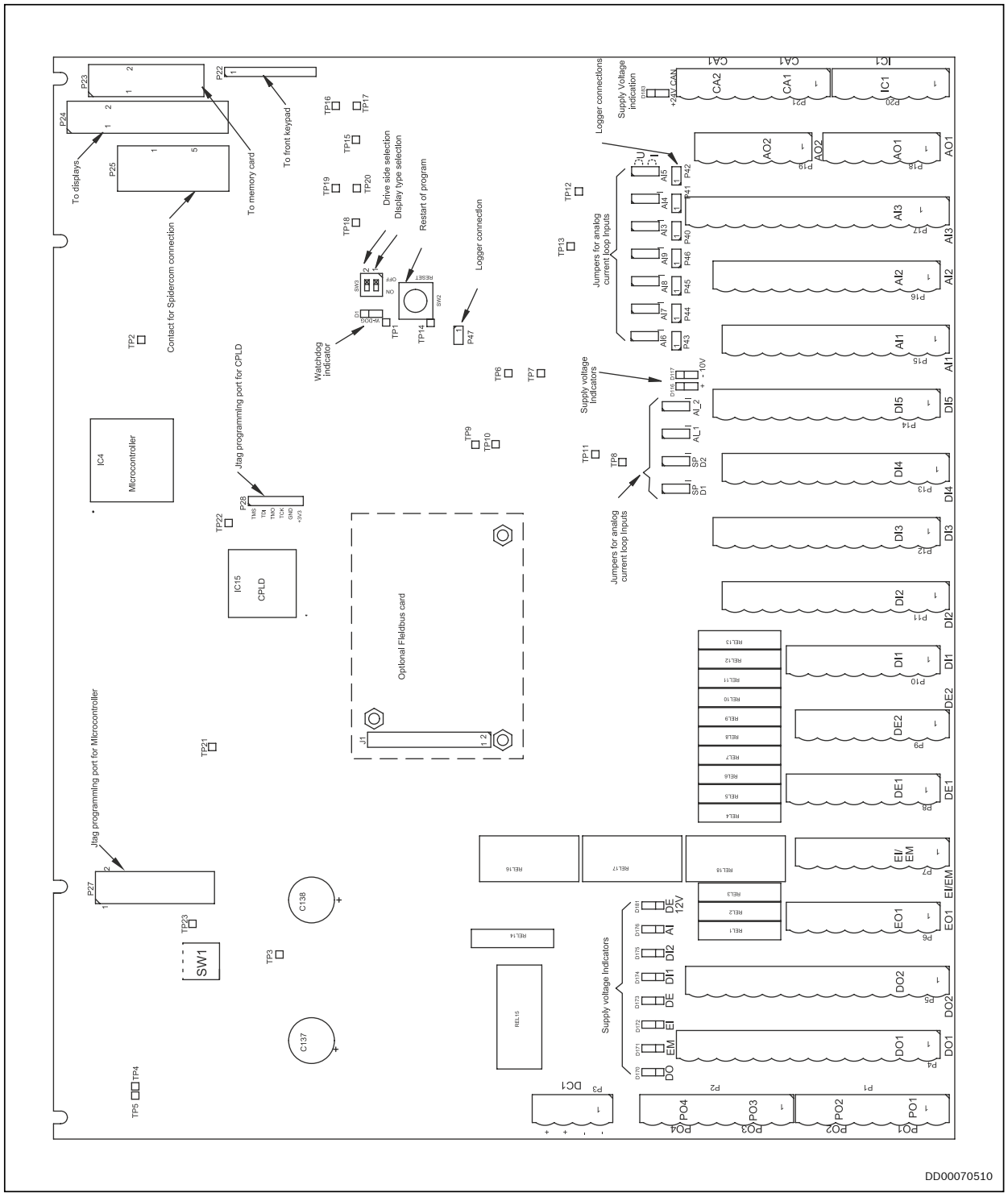
4 Main boards, Jumpers & Terminals

4.1 Main card jumpers and indications

4.1.1 Revision A



4.1.2 Revision B, C and D



4.1.3 Jumpers

Function	Jumper name	Settings
Signal type for speed setpoint, Drive 1	SP D1	Upper position = voltage signal Lower position = current signal
Signal type for speed setpoint, Drive 2	SP D2	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 1	AI1	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 2	AI2	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 3	AI3	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 4	AI4	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 5	AI5	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 6	AI5	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 7	AI7	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 8	AI8	Upper position = voltage signal Lower position = current signal
Signal type for configurable analog input 9	AI9	Upper position = voltage signal Lower position = current signal
Switch level selector for pulse 1 on Speed encoder 1	P48	D = Differential pulse encoder S = Single pulse encoder
Switch level selector for pulse 2 on Speed encoder 1	P49	D = Differential pulse encoder S = Single pulse encoder
Switch level selector for pulse 1 on Speed encoder 2	P50	D = Differential pulse encoder S = Single pulse encoder
Switch level selector for pulse 2 on Speed encoder 2	P51	D = Differential pulse encoder S = Single pulse encoder

4.1.4 Indicators

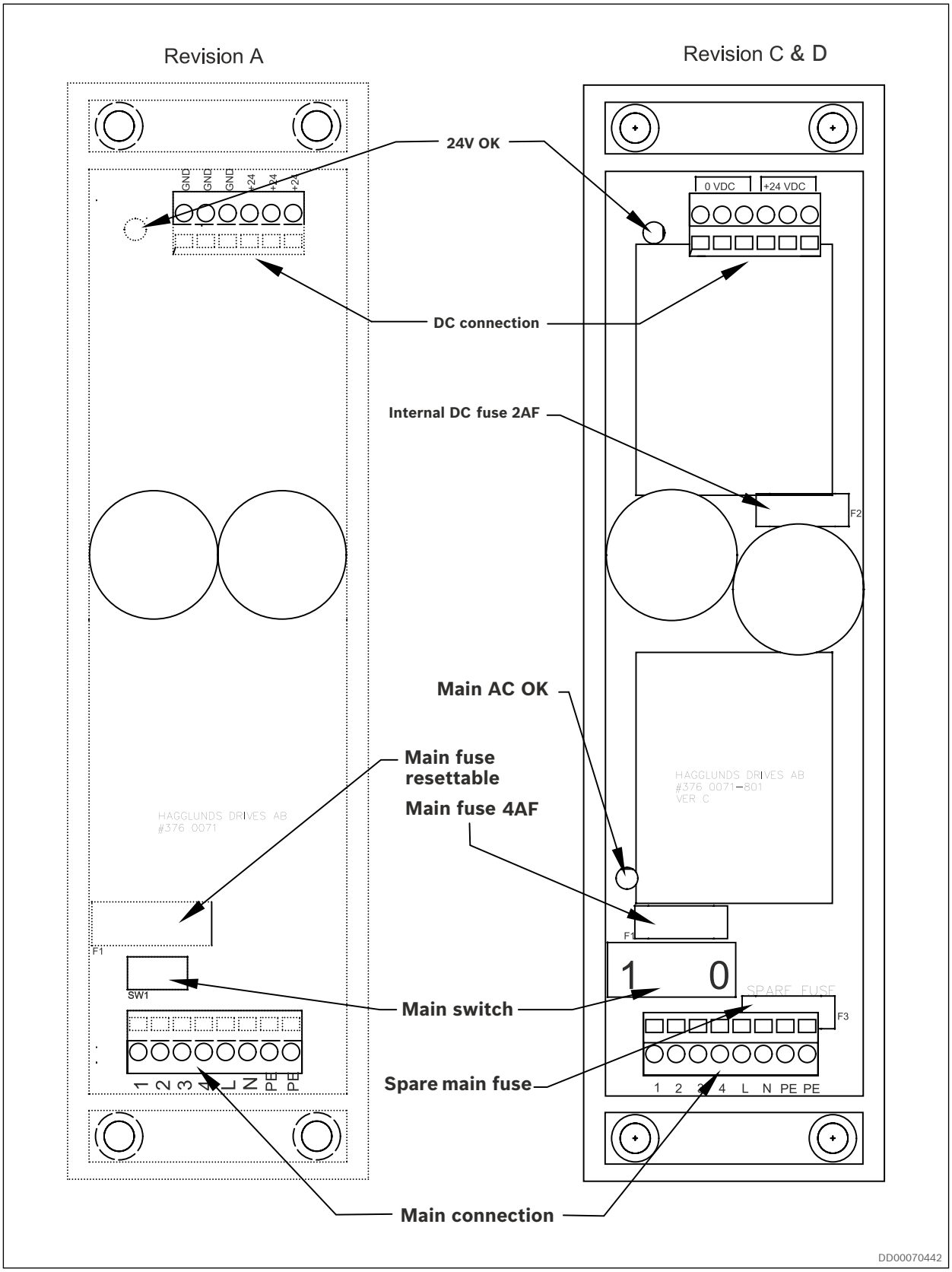
Function	Indicator name	Note
Shutdown	D1, red (W-DOG)	Normally off. Will be active by microprocessor watchdog error.
Digital output supply	D170, green (DO)	Normally on. Indicates supply to digital outputs. Will be off by external short circuit or by emergency stop.
Emergency stop supply	D171, green (EM)	Normally on. Will be off by external short circuit
E-motor input supply	D172, green (EI)	Normally on. Will be off by external short circuit
Encoder supply 24V	D173, green (DE)	Normally on. Will be off by external short circuit
Digital input supply 1	D174, green (DI1)	Normally on. Will be off by external short circuit
Digital input supply 2	D175, green (DI2)	Normally on. Will be off by external short circuit
Analog input supply	D176, green (AI)	Normally on. Will be off by external short circuit
Encoder supply 12V	D181, green (DE 12V)	Normally on. Will be off by external short circuit
+10V ref.voltage for potentiometer	D116, green (+10V)	Normally on. Will be off by external short circuit
-10V ref.voltage for potentiometer	D117, green (-10V)	Normally on. Will be off by external short circuit
CANbus supply 24V	D183, green	Normally on. Will be off by external short circuit

4.1.5 Switches

Function	Pos. name	Note
Emergency stop shutdown	SW1	Timer for backup emergency stop shutdown
Display type	SW3-1	On=LCD display type (standard) Off= VFD display type
Drive position on front panel	SW3-2	On= Drive 1 left (standard) Off= Drive 1 right

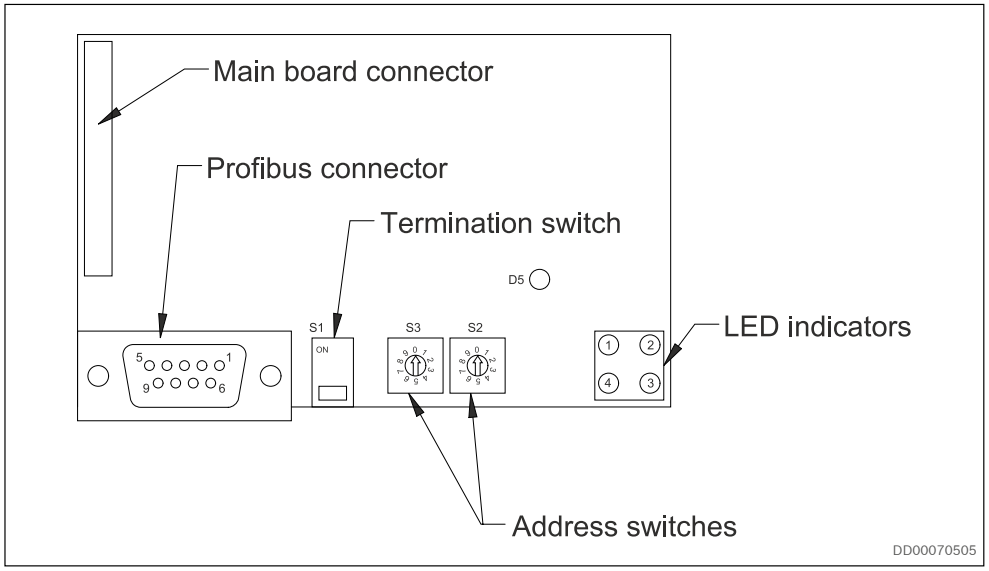
4.2 Power supply

4.2.1 Standard versions



4.3 Fieldbus card

4.3.1 Profibus



4.3.1.1 Indicators

Indicator name	Description	Function	Information
D1	Not used	Not used	Normal function
D2	Online	Green	Module is On-Line and ready, data exchange is possible.
		Off	Module is not On-Line.
D3	Offline	Red	Module is Off-Line.
		Off	Module is not Off-Line.
D4	Diagnostics	Red flashing 1 Hz	Configuration error. Data length.
		Red flashing 2 Hz	Configuration error. User parameter.
		Red flashing 4 Hz	Initialisation error of the Profibus communication ASIC
		Off	No error
D5	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

4.3.1.1 Switches

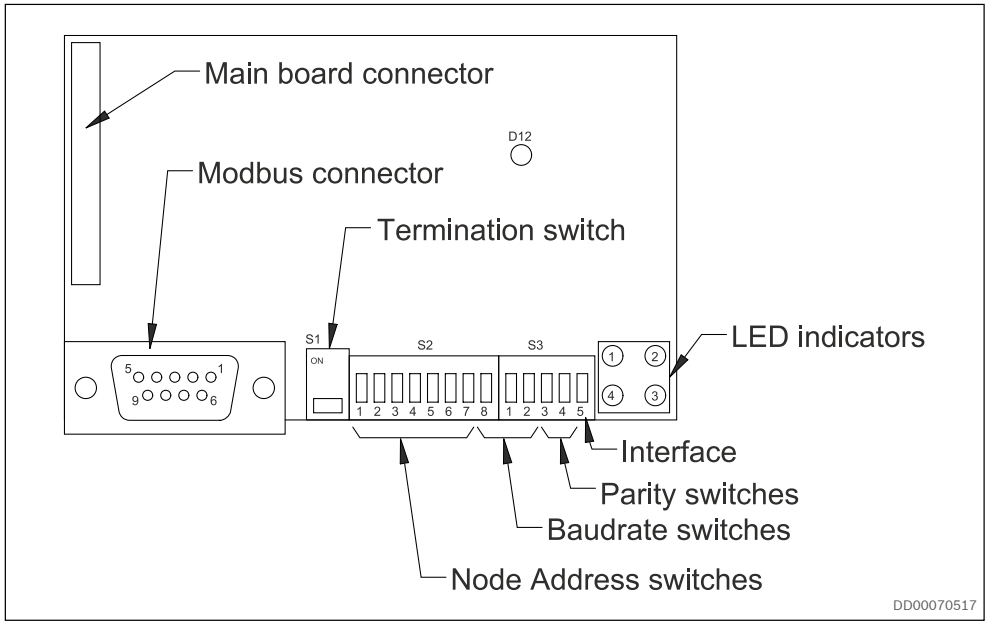
Indicator name	Function	Information
S1	Terminating switch	On= Enabled (if first or last in a network) Off= Disabled
S2	Node Adress	x1 for the node address setting
S3	Node Adress	x10 for the node address setting

4.3.1.2 Profibus connector (Female 9-pin D-sub)

Pin	Function	Information
Housing	Shield	Connected to PE
1	Not connected	
2	Not connected	
3	B-line	Positive RxD/TxD
4	RTS	Request to send*
5	GND Bus	Isolated from RS485 side*
6	+5V Bus	Isolated from RS485 side*
7	Not connected	
8	A-line	Negative RxD/TxD
9		

*Used for bus terminators in special cases. Normally only A-line, B-line and shield are used.

4.3.2 Modbus RTU



4.3.2.1 Indicators

Indicator name	Description	Function	Information
D1	Processing	Green flashing	Receiving Query and building response
		Off	No Query.
D2	Bus error	Red	Bus error
		Off	Normal operation
D3	Offline	Red	Module is Off-Line.
		Off	Module is not Off-Line.
D4	HW settings status	Green	Bus ready. Normal operation.
		Red	Bus timeout error.
		Off	Bus not initialized correctly.
D12	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

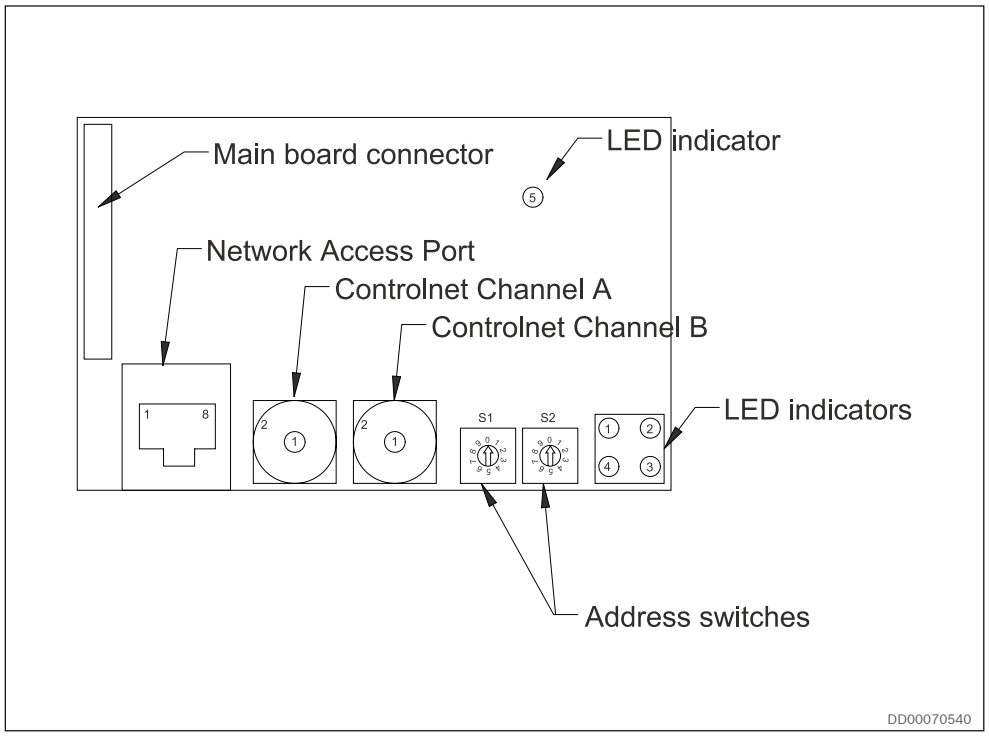
4.3.2.2 Switches

Indicator name	Function	Settings	Information
S1	Terminating switch	On	Enabled (if first or last in a network)
		Off	Disabled
S2:1-7	Node Adress Switch:	Binary value: 1234567	
		0000000	Not valid
		0000001	1
		0000010	2
		0000011	3
		...	...
		...	...
		1111111	127
S2:8 S3:1-2	Baud rate Switch:	Binary value 812	Not valid
		000	1200
		001	2400
		010	4800
		011	9600
		100	19200 (Default)
		101	38400
		110	57600
		111	
S3:3-4	Parity	Binary value 34	Not valid
		00	None(Default)
		01	Even
		10	Odd
		11	
S3:5	Physical interface	0 = RS-485 1 = RS-232	

4.3.2.3 Modbus connector (Female 9-pin D-sub)

Pin	Function	Information
Housing	Shield	Connected to PE
1	Not connected	
2	RS232-TX	Transmit signal
3	RS232-RX	Recive signal
4	Not connected	
5	GND Bus	Signal grund
6	+5V Bus	
7	RS485D0	
8	RS485D0	
9	Not connected	

4.3.3 ControlNet



Network Access port provides temporary access to the ControlNet network for diagnostics and configuration. ControlNet BNC contacts. If redundant operation is desired both contacts are used otherwise A or B is used

4.3.3.1 Indicators

Indicator name	Description	Function	Information
D1	Module status	Green	Connection run state
		Green flashing	Connection Idle
		Red	Major fault
		Red flashing	Minor fault
D2	Channel A and channel B	Off	Module not initialized
		Red	Major fault
		Alternating red/green	Self test
		Red flashing	Node configuration error, Mac ID etc
D3	Channel A or channel B	Off	Channel disabled
		Green	Normal operation of channel
		Green flashing	Temporary error (node will self correct) or not configured
		Red flashing	No other nodes or media fault
		Red and green flashing	Network configuration error
D4	Module owned	Off	No connection has been opened
		Green	A connection has been opened towards the module
D5	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

4.3.3.2 Switches

Indicator name	Function	Settings	Information
S1	Node adress	x10 for the node address setting	Node adress
S2	Node adress	x10 for the node address setting	Node adress

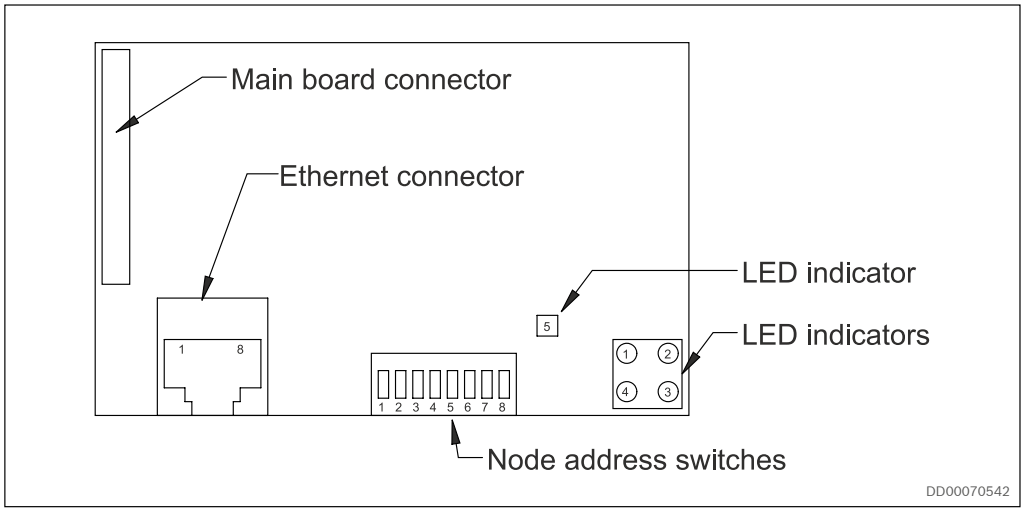
4.3.3.3 ControlNet connector (BNC)

Pin name	Function	Information
1	ControlNet	Tip
2	Shield	Ring

4.3.3.4 ControlNet connector (RJ45)

Pin name	Function	Information
1	GND	
2	Not connected	Transmit signal
3	Tx_H	Transmit data, positive
4	Tx_L	Transmit data, negative
5	Rx_L	Receive data, negative
6	Rx_H	Receive data, positive
7	Not connected	
8	Shield	Connected to PE

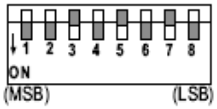
4.3.4 Ethernet/IP



4.3.4.1 Indicators

Indicator name	Description	Function	Information
D1	Link activity	Off	Link not sensed
		Green	Link sensed
D2	Module status	Off	No power
		Green	Controlled by scanner in run mode
		Green flashing	Not configured, or scanner in idle state
		Red flashing	A minor recoverable fault has been detected
		Red	A major unrecoverable fault has been detected
		Alternating green/red	Selftest in progress
D3	Network status	Off	No power or IP adress
		Green	Online, one or more connections established
		Green flashing	Online, no connections established
		Red	Duplicate IP address, fatal error
		Red flashing	One more connections timed out
		Alternating green flashing	Self tested in progress
D4	Activity	Green flashing	Flashes each time a packet is received or transmitted
D5	Watchdog	Green flashing 1 Hz	Initialized and running OK.
		Green flashing 2 Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

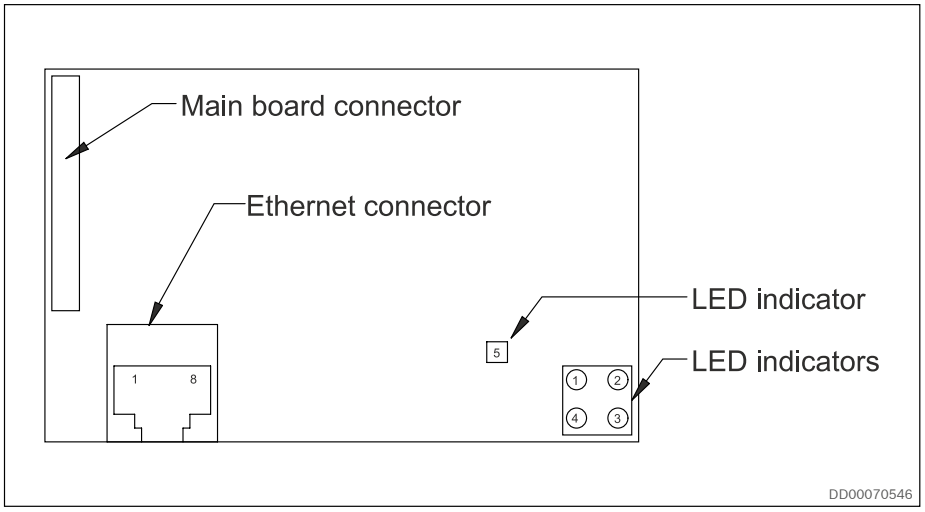
4.3.4.2 Switches

Switch name	Function	Settings
Node adress 	IP adress: 192.168.0.x (x=Binary value) Gateway: 255.255.255.0 Subnet: 255.255.255.0 DHCP: OFF	Binary value: 0000001 - 192.168.0.1 0000011 - 192.168.0.3 ... 1111111 - 192.168.0.255

4.3.4.3 Ethernet connector (RJ45)

Pin name	Function	Information
1	TD+	
2	TD-	
3	RD+	
4	Termination	
5	Termination	
6	RD-	
7	Termination	
8	Termination	

4.3.5 ProfiNet



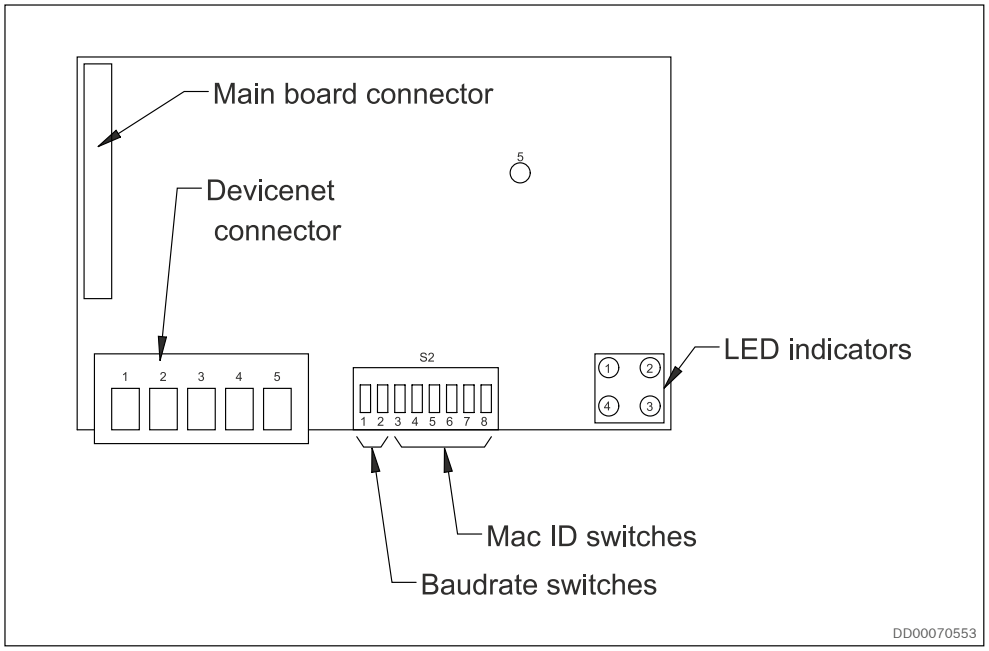
4.3.5.1 Indicators

Indicator name	Description	Function	Information
D1	Link activity	Off	No link
		Green flashing	Receiving/Transmitting data
		Green	Link established
D2	Communication satus	Off	Off line
		Green	Connection established and controller in RUN state
		Green 1 flash	Connection established and controller in stop state
D3	Module status	Off	No power or not initialized
		Green	Initialized, no error
		Green 1 flash	Diagnostic data available
		Green 2 flashes	Blink. Used by engineeringtool to identify module
		Red 1 flash	Configuration error • Too many modules • I/O size derived from controller too large • Configuration mismatch
		Red 3 flashes	No station address or IP address assigned
		Red 4 flashes	Internal error
D4	Not used		
D5	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

4.3.5.2 ProfiNet connector (RJ45)

Pin name	Function	Information
1	TD+	
2	TD-	
3	RD+	
4	Termination	
5	Termination	
6	RD-	
7	Termination	
8	Termination	

4.3.6 DeviceNet



4.3.6.1 Indicators

Indicator name	Description	Function	Information
D1	Not used		
D2	Network status	Off	Not powered/Not online
		Green	Link OK, Online, Connected
		Green flashing	On line, Not connected
		Red steady	Critical link failure
		Red flashing	Connection timeout
D3	Module status	Off	No power to device
		Green	Device operational
		Green flashing	Data size bigger than configured
		Red steady	Unrecoverable fault
		Red flashing	Minor fault
D4	Not used		
D5	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

4.3.6.2 Switches

Baud rate:

Baud rate	Sw1	Sw2	Information
125kbit/sec	OFF	OFF	
250kbit/sec	OFF	ON	
500kbit/sec	ON	OFF	
Reserved	ON	ON	

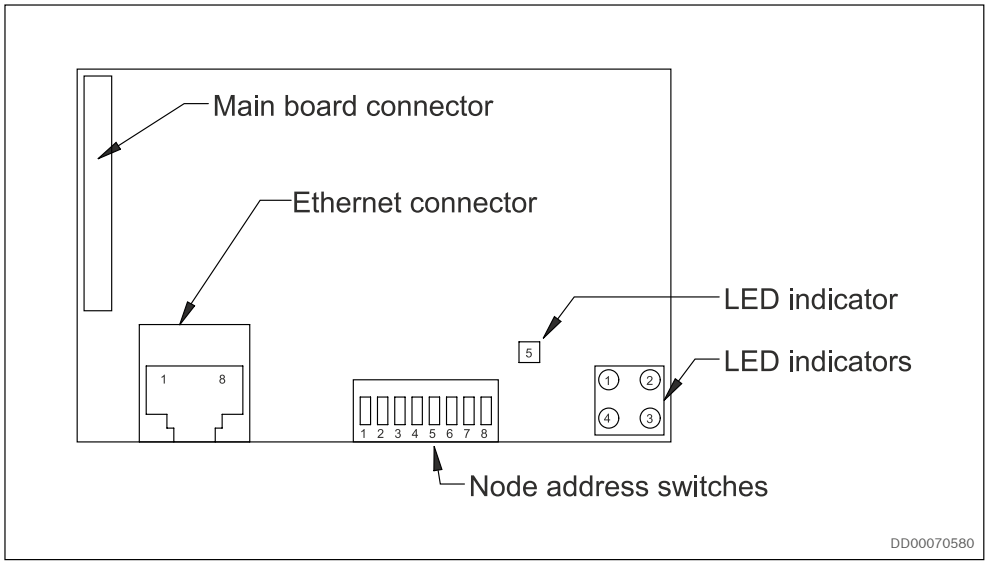
Node adress:

MAc ID	Sw3 (MSB)	Sw4	Sw5	Sw6	Sw7	Sw8 (LSB)
0	OFF	OFF	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	OFF	OFF	ON
2	OFF	OFF	OFF	OFF	ON	OFF
3	OFF	OFF	OFF	OFF	ON	ON
...	...	...	...	...	...	...
62	ON	ON	ON	ON	ON	OFF
63	ON	ON	ON	ON	ON	ON

4.3.6.3 DeviceNet connector (Pluggable screw type)

Pin name	Function	Information
1	V-	Negative supply (0VDC)
2	CAN_L	CAN_L bus line
3	Shield	Cable shield
4	CAN_H	CAN_H bus line
5	V+	Positive supply (+24VDC)

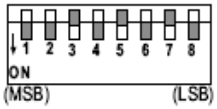
4.3.7 Modbus TCP



4.3.7.1 Indicators

Indicator name	Description	Function	Information
1	Link Activity	Off	Link not sensed
		Green	Link sensed
2	Module Status	Off	No power
		Green flashing 1Hz	IP address not set using switch
		Red flashing 1Hz	Invalid MAC address
		Red flashing 2Hz	Failed to load config. from FLASH
		Red flashing 4Hz	Internal error (fatal)
		Red	Duplicate IP address detected
3	Established connections		Established connections to the module is equal to the number of flashes
4	Activity	Green, flashing	Flashes eatch time a packet is received or transmitted
5	Watchdog	Green flashing 1Hz	Initialized and running OK.
		Green flashing 2Hz	Not initialised.
		Red	Unspecified internal error or running in boot loader mode.
		Red flashing 1 Hz	RAM failure.
		Red flashing 2 Hz	ASIC or FLASH failure.
		Red flashing 4 Hz	DPRAM failure.

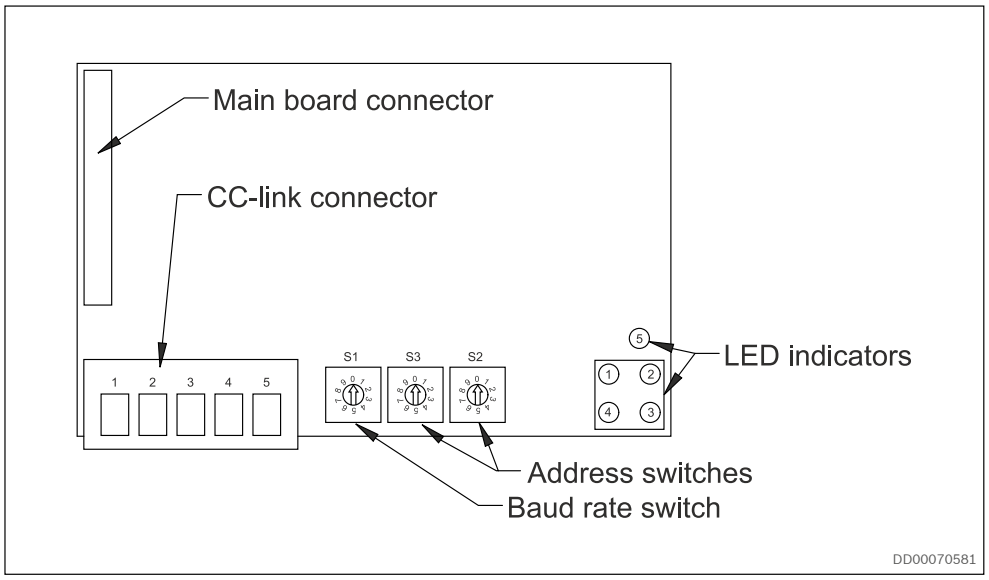
4.3.7.2 Switches

Switch name	Function	Settings
Node adress 	IP adress: 192.168.0.x (x=Binary value) Gateway: 255.255.255.0 Subnet: 255.255.255.0 DHCP: OFF	Binary value: 0000001 - 192.168.0.1 0000011 - 192.168.0.3 ... 1111111 - 192.168.0.255

4.3.7.3 Modbus TCP connector (RJ45)

Pin name	Function	Information
1	TD+	
2	TD-	
3	RD+	
4		Normally left unused. Internally tied together and terminated to PE.
5		
6	RD-	
7		Normally left unused. Internally tied together and terminated to PE.
8		

4.3.8 CC-link



4.3.8.1 Indicators

Indicator name	Description	Function	Information
D1	RUN	On Off	Normal operation No network connection or Timeout
D2	ERRL	RED OFF	CRC error detected Illegal station number illegal baud rate Normal operation
D3	RDLED	Green Off	Data being received No data transmission
D4	SDLED	Green Off	Data being received No data transmission
D5	Watchdog	Green flashing 1Hz Green flashing 2Hz Red Red flashing 1 Hz Red flashing 2 Hz Red flashing 4 Hz	Initialized and running OK. Not initialised. Unspecified internal error or running in boot loader mode. RAM failure. ASIC or FLASH failure. DPRAM failure.

4.3.8.2 Switches

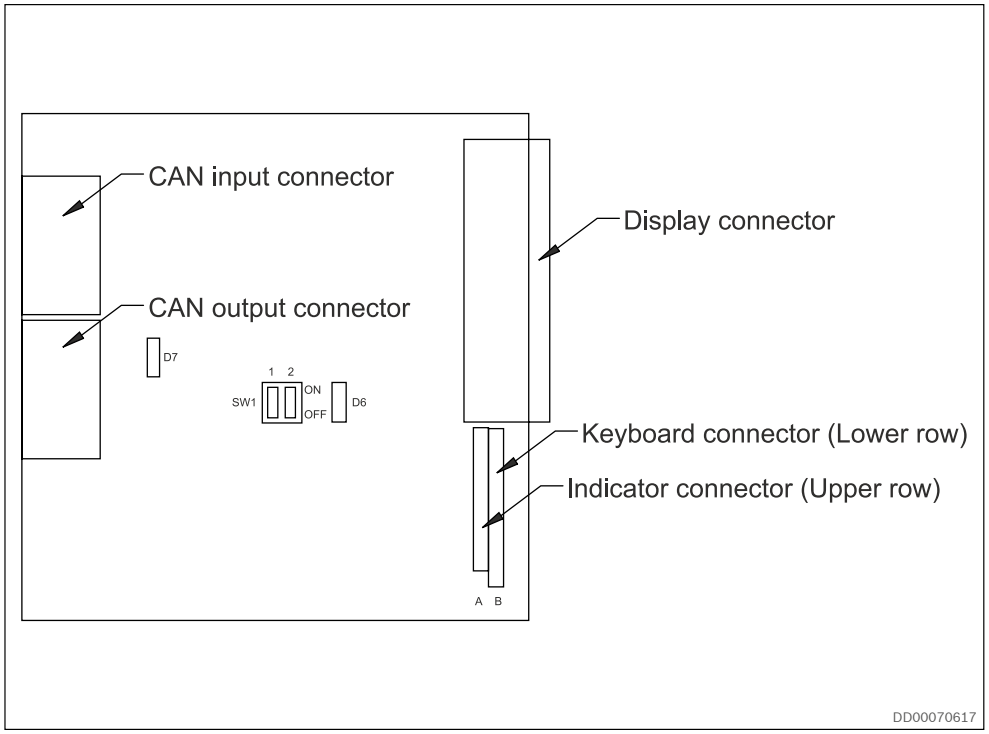
Indicator name	Function	Information
S1	Baud rate switch	0 = 156k 1 = 625k 2 = 2,5M 3 = 5M 4 = 10M 9 = FB_INIT
S2	Node adress	x1 for the node address settings
S3	Node adress	x1 for the node address settings

4.3.8.3 CC-link connector (Pluggable screw type)

Pin name	Function	Information
1	DA	Communication line
2	DB	Communication line
3	DG	Digital ground
4	Shield	
5	FG/PE	Frame ground

4.4 Spider control panel card

The Spider control panel card unit handles the communication between the Spider control unit and the Spider control panel.



4.4.1 Indicators

Indicator name	Description	Function	Information
D6	Power	Green	Normal operation, Power OK
D7	Operate	Green 2Hz	Normal operation

4.4.2 Switches

Indicator name	Function	Information
SW1-1	Drive selection	On = One card is used (Jumpered contact must be connected in CAN output connector) Off = Card used for drive 2
Sw1-2	Not used	

4.5 Terminal functions

Table of terminal function

Row	Type	Name	No.	Function
1	Power input	DC1	4	24V_IN (+)
			3	24V_IN (+)
			2	GND (–)
			1	GND (–)
	Pump 4	PO4	4	Common pump 4
			3	Stroker connection B
			2	Common pump 4
			1	Stroker connection A
	Pump 3	PO3	4	Common pump 3
			3	Stroker connection B
			2	Common pump 3
			1	Stroker connection A
	Pump 2	PO2	4	Common pump 2
			3	Stroker connection B
			2	Common pump 2
			1	Stroker connection A
	Pump1	PO1	4	Common pump 1
			3	Stroker connection B
			2	Common pump 1
			1	Stroker connection A
2	Digital outputs	DO1	14	Configurable Digital output 6
			13	Configurable Digital output 6
			12	Configurable Digital output 5
			11	Configurable Digital output 5
			10	Configurable Digital output 4
			9	Configurable Digital output 4
			8	Configurable Digital output 3
			7	Configurable Digital output 3
			6	Configurable Digital output 2
			5	Configurable Digital output 2
			4	Configurable Digital output 1
			3	Configurable Digital output 1
			2	24V_DO
			1	GND

Row	Type	Name	No.	Function
3	**Digital outputs**	DO2	14	Configurable Digital output 13
			13	Configurable Digital output 12
			12	Configurable Digital output 11
			11	Common Digital output 11-13
			10	Configurable Digital output 10
			9	Configurable Digital output 10
			8	Configurable Digital output 9
			7	Configurable Digital output 9
			6	Configurable Digital output 8
			5	Configurable Digital output 8
			4	Configurable Digital output 7
			3	Configurable Digital output 7
			2	24V_DO
			1	GND
4	**E-motor interlocks**	EO1	8	Interlock Electric motor 3
			7	Interlock Electric motor 3
			6	Interlock Electric motor 2
			5	Interlock Electric motor 2
			4	Interlock Electric motor 1
			3	Interlock Electric motor 1
			2	24V_DO
			1	GND
5	**E-motor started inputs**	E1	8	E-motor 3 started
			7	E-motor 2 started
			6	E-motor 1 started
			5	24V_EI
			4	24V_EI
			3	GND
	EM stop	EM	2	Em.stop
			1	24V_EM

Row	Type	Name	No.	Function
6	Digital speed encover Drive 1	DE1	8	Pulse 0 Drive 1+
			7	Pulse 2 Drive 1 -
			6	Pulse 2 Drive 1+
			5	Pulse 1 Drive 1 -
			4	Pulse 1 Drive 1+
			3	12V+
			2	24V_DE
			1	GND
7	Digital speed encover Drive 2	DE2	8	Pulse 0 Drive 2+
			7	Pulse 2 Drive 2 -
			6	Pulse 2 Drive 2+
			5	Pulse 1 Drive 2 -
			4	Pulse 1 Drive 2+
			3	12V+
			2	24V_DE
			1	GND
8	Configurable digital inputs *Predefined monitoring inputs*	DI1	8	Config input 6 (Drain filter)
			7	Config input 5 (Low oil level in tank)
			6	Config input 4 (Min oil level in tank)
			5	Config input 3 (Min oil temperature in tank)
			4	Config input 2 (High oil temperature in tank)
			3	Config input 1 (Max oil temperature in tank)
			2	24V_DI_1
			1	GND
9	Configurable digital inputs *Predefined monitoring inputs*	DI2	12	Config input 15
			11	Config input 14 (Work pressure, pump 2)
			10	Config input 13 (Charge pressure, pump 2)
			9	Config input 12 (Suction line, pump 2)
			8	Config input 11 (Return filter 100%, pump 2)
			7	Config input 10 (Work pressure, pump 1)
			6	Config input 9 (Charge pressure, pump 1)
			5	Config input 8 (Suction line, pump 1)
			4	Config input 7 (Return filter 100%, pump 1)
			3	24V_DI_1
			2	24V_DI_1
			1	GND

Row	Type	Name	No.	Function
10	**Configurable digital inputs** *Predefined monitoring inputs*	DI3	12	Config input 24
			11	Config input 23 (Work pressure, pump 4)
			10	Config input 22 (Charge pressure, pump 4)
			9	Config input 21 (Suction line, pump 4)
			8	Config input 20 (Return filter 100%, pump 4)
			7	Config input 19 (Work pressure, pump 3)
			6	Config input 18 (Charge pressure, pump 3)
			5	Config input 17 (Suction line, pump 3)
			4	Config input 16 (Return filter 100%, pump 3)
			3	24V_DI_1
			2	24V_DI_1
			1	GND
11	**Configurable digital inputs**	DI4	12	Config input 33
			11	Config input 32
			10	Config input 31
			9	Config input 30
			8	Config input 29
			7	Config input 28
			6	Config input 27
			5	Config input 26
			4	Config input 25
			3	24V_DI_2
			2	24V_DI_2
			1	GND
12	**Configurable digital inputs**	DI5	12	Config input 43
			11	Config input 42
			10	Config input 41
			9	Config input 40
			8	Config input 39
			7	Config input 38
			6	Config input 37
			5	Config input 36
			4	Config input 35
			3	Config input 34
			2	24V_DI_2
			1	GND

Row	Type	Name	No.	Function
13	Analog inputs Isolated	AI1	12	Config input 2 -
			11	Config input 2+
			10	Config input 1 -
			9	Config input 1+
			8	Remote speed set point Drive 2 -
			7	Remote speed set point Drive 2 +
			6	Remote speed set point Drive 1 -
			5	Remote speed set point Drive 1 +
			4	Isolated 10VREF -
			3	Isolated 10VREF+
			2	Isolated GND
			1	Isolated GND
14	Analog inputs Not isolated	AI2	12	Config input 6 -
			11	Config input 6+
			10	Config input 5 -
			9	Config input 5+
			8	Config input 4 -
			7	Config input 4+
			6	Config input 3 -
			5	Config input 3+
			4	24V_AI
			3	24V_AI
			2	GND
			1	GND
15	Analog inputs Not isolated	AI3	14	Tank temp, force low
			13	Tank temp, sense low
			12	Tank temp, sense high
			11	Tank temp, force high
			10	Config input 9 -
			9	Config input 9+
			8	Config input 8 -
			7	Config input 8+
			6	Config input 7 -
			5	Config input 7+
			4	24V_AI
			3	24V_AI
			2	GND
			1	GND

Row	Type	Name	No.	Function
16	Analog outputs	AO2	6	Current output 4
			5	Voltage output 4
			4	Current output 3
			3	Voltage output 3
			2	24VDC external supply. Internally supplied from revB
			1	GND (external)
		AO1	6	Current output 2
			5	Voltage output 2
			4	Current output 1
			3	Voltage output 1
			2	24VDC external supply. Internally supplied from revB
			1	GND (external)
17	CAN1	CA	8	+24V CAN
			7	CAN2 L
			6	CAN2 H
			5	0V
	CAN2		4	+24V CAN
			3	CAN1 L
			2	CAN1 H
			1	0V
		IC	6	For interconnection purpose
			5	For interconnection purpose
			4	For interconnection purpose
			3	For interconnection purpose
			2	For interconnection purpose
			1	For interconnection purpose

5 Techical data

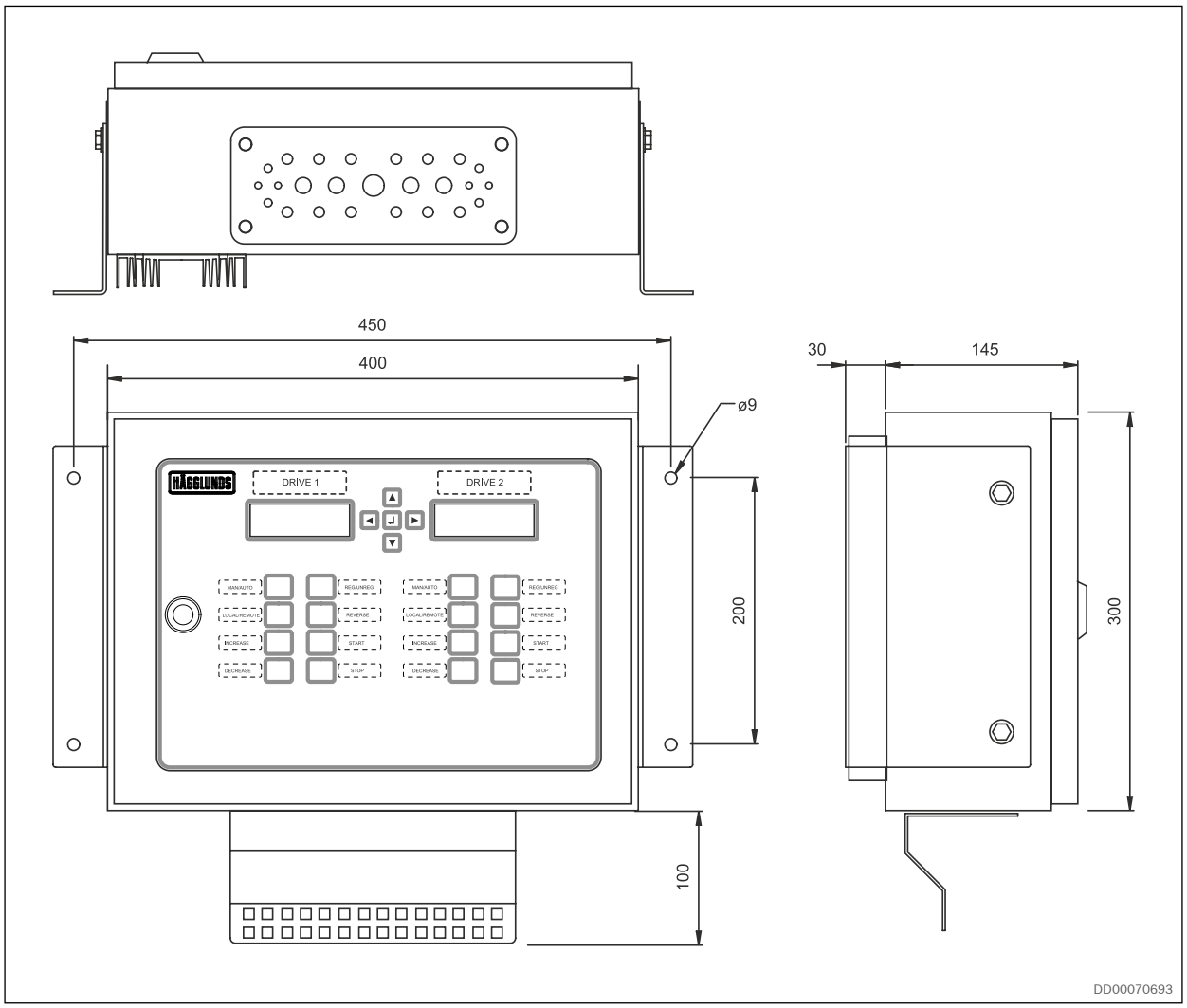
5.1 Mechanical

5.1.1 Mechanical data

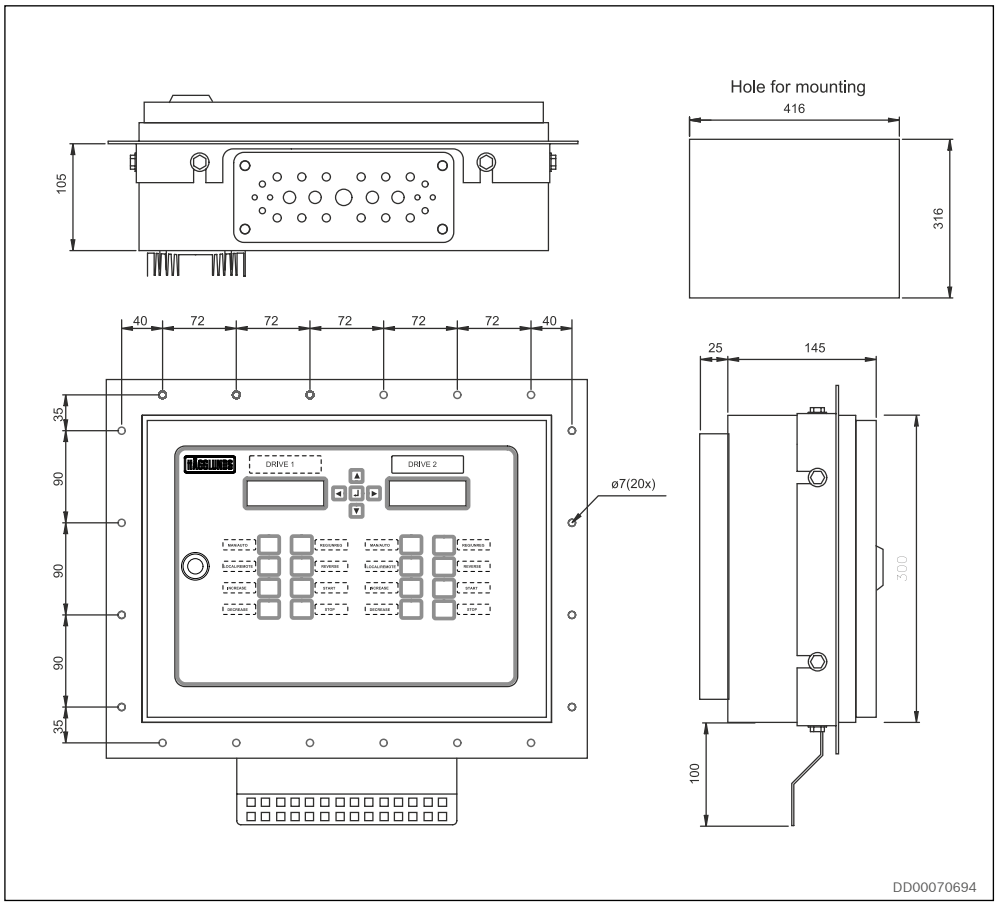
Cubicle dimension	W=400mm H=300mm D=145mm
Encapsulation class	IP 65
Ambient temperature	-20...+50 °C, -40 °C with heater *
Material enclosure	Stainless steel
Material front	Polyester film
Mounting	Wall brackets or flange
Weight	8kg (10kg with brackets or flange)
Cable size	Max 2.5mm^2

***** Heater supplied as option

5.1.2 Wall bracket mounting



5.1.3 Flange mounting

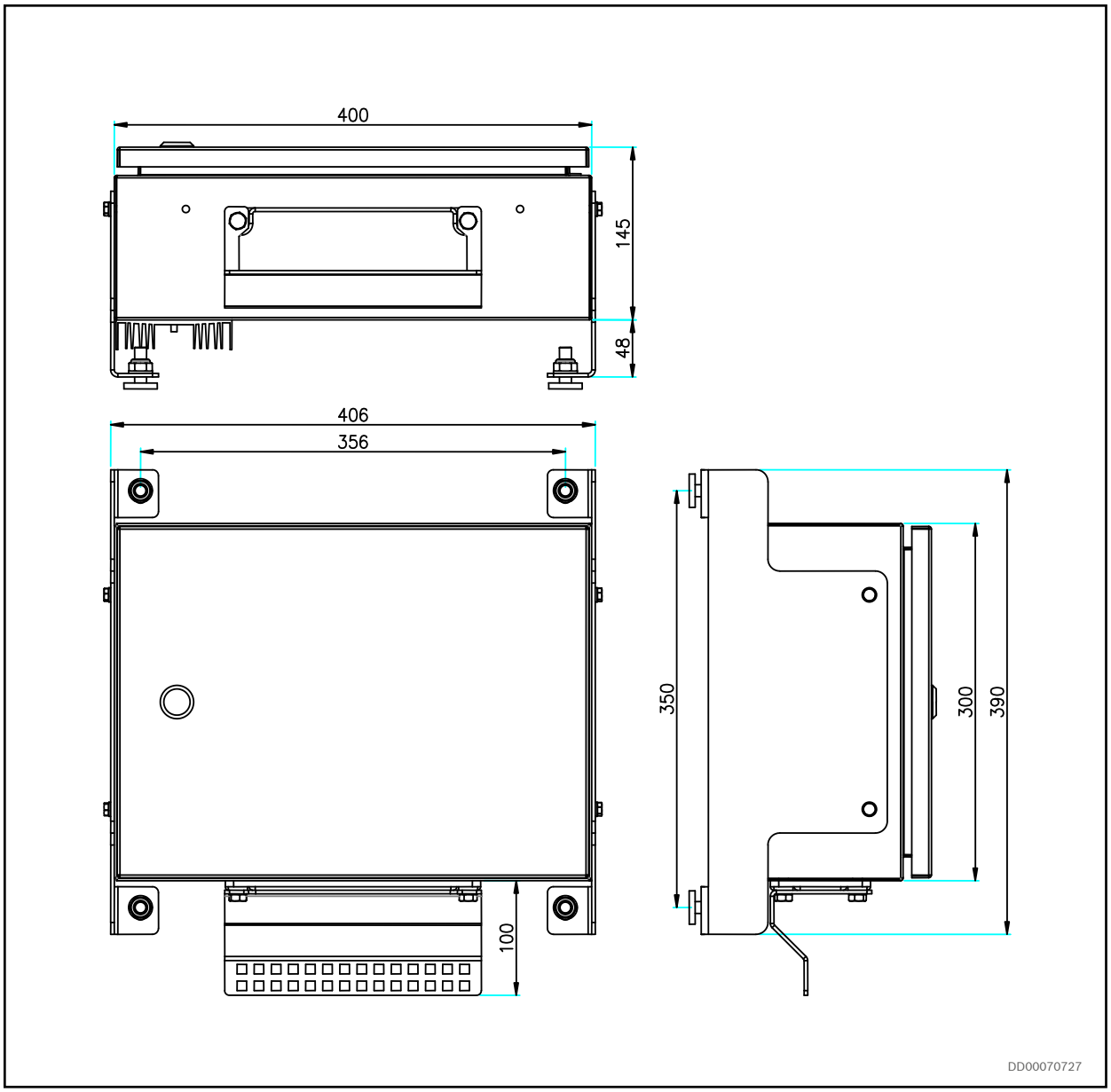


5.1.4 Polyester front

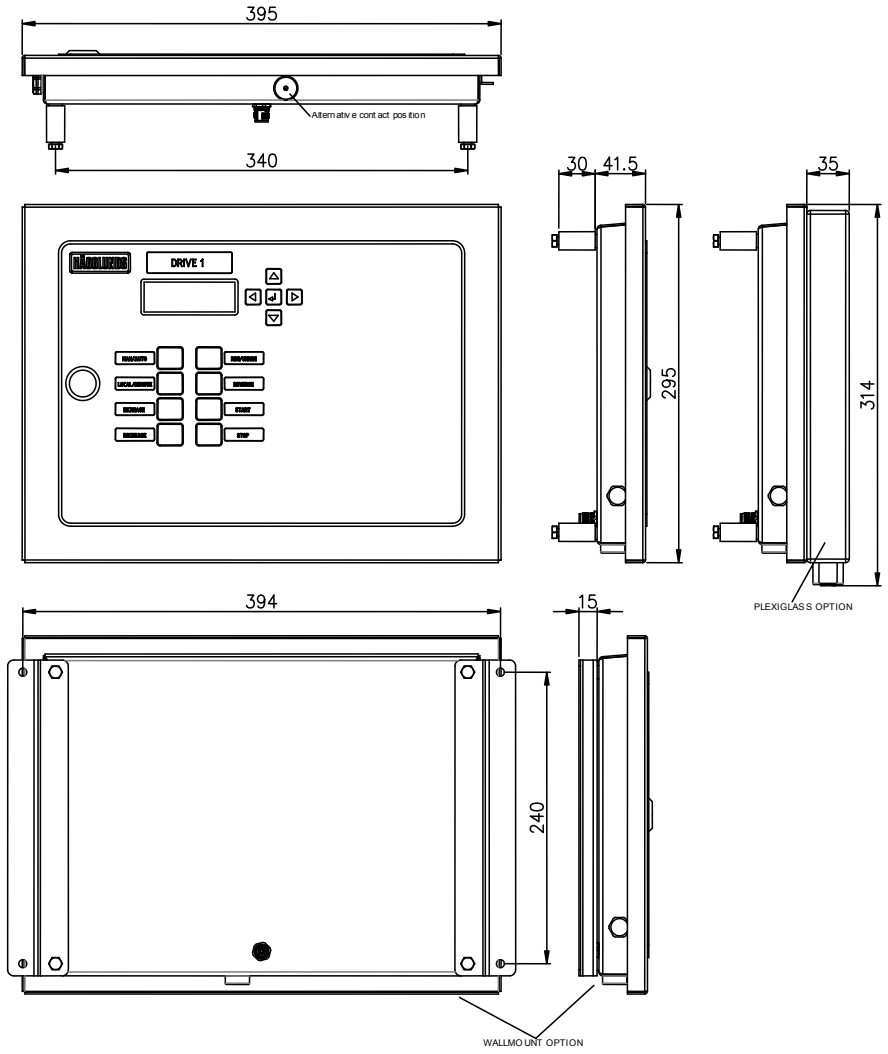
Chemical resistance to:

- Alcohols
- Dilute acids
- Dilute alkalis
- Esters
- Hydrocarbons
- Ketones
- Household cleaning agents

5.1.5 DU version with blank door and C-rail mount



5.1.6 Spider control panel



5.2 Supply and output voltage

5.1.7 Supply voltage

Embedded AC power supply

Main supply voltage	Autoranging 90-132, 180-264 VAC 47-63Hz (No configuration needed)
Power consumtion	Max 300VA, Depending on configuration (+50VA with heater)*
Inrush current	Max 30A
Main fuse	6A
Fuses,Rev B supply Main Internal DC Output Fuses, New version	 4A fast, 5x20mm ceramic, R913027788 2A fast, 5x20mm ceramic, R913027812 2A fast, 5x20mm ceramic, R913027812

* Heater supplied as option

External DC power supply power supply

Card supply	24 VDC ± 10% , Max 8A Depending on configuration
Power consumtion (without load)	320mA

5.2.1 Output voltage

Analog reference voltage (isolated)	+10V -10V	+10 VDC 35 mA -10 VDC 35 mA
Digital input supply 1	DI1	+24 VDC 0.3A
Digital input supply 2	DI2	+24 VDC 0.3A
Digital encoder supply	DE	+24 VDC 0.3A
Digital encoder supply	12_DE	+12 VDC 0.1A
Analog input supply	AI	+24 VDC 0.3A
Emergency stop supply	EM	+24 VDC 0.3A
Digital output supply	DO	+24 VDC 0.8A
E-motor started supply	EI	+24 VDC 0.3A

5.3 Inputs

5.3.1 Analog inputs

No	Description	Type	Impedance
1	Speed set point Drive 1 or Friction set point Drive 1 (isolated)	±0-5 VDC ±0-10 VDC ±4-20 mA ±0-20 mA	100k Ω 100k Ω 250 Ω 250 Ω
1	Speed set point Drive 2 or Friction set point Drive 2 (isolated)	±0-5V DC ±0-10 VDC ±4-20 mA ±0-20 mA	100k Ω 100k Ω 250 Ω 250 Ω
2	Configurable analog inputs (isolated)	+0-5 VDC +0-10 VDC +4-20 mA +0-20 mA	100k Ω 100k Ω 250 Ω 250 Ω
7	Configurable analog inputs (differential)	+0-5 VDC +0-10 VDC +4-20 mA +0-20 mA	100k Ω 100k Ω 250 Ω 250 Ω
1	Tank temp input, -29...+107 ºC	PT100	

5.3.2 Digital inputs

No	Description	Type	Impedance	Max input
1	Digital speed feedback Drive 1 Differential or single with direction signal	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	4,8k Ω 10nF	f max 10 kHz
1	Zero position input Drive 1	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	4,8k Ω 10nF	
1	Digital speed feedback Drive 2 Differential or single with direction signal	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	4,8k Ω 10nF	f max 10 kHz
1	Zero position input Drive 2	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	4,8k Ω 10nF	
1	Electric motor 1 started from starter unit	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	1k Ω	
1	Electric motor 2 started from starter unit	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	1k Ω	
1	Electric motor 3 started from starter unit	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	1k Ω	
43	Configurable inputs	logical 0=0-3,9 VDC logical 1=6,6-32 VDC	3k Ω	
1	Machine stop input	logical 0=0-4,7 VDC logical 1=8,0-32 VDC	800 Ω	

5.4 Outputs

5.4.1 Pump control

No	Description	Type	Impedance	Max input
4	Stroker output, dual coil	PWM (Pulse width modulated)	5-100 Ω**	2A*

* Total current for all outputs 5A
** Max output reduced above 10 Ω to 20/Impedance (A)

5.4.2 Digital outputs

No	Description	Type	Max input
1	Starter interlock E-motor 1	Realy contact	3A, 30VDC, 250VAC
1	Starter interlock E-motor 2	Realy contact	3A, 30VDC, 250VAC
1	Starter interlock E-motor 3	Realy contact	3A, 30VDC, 250VAC
13	Configurable outputs (Dout 11,12,13 has a combined maximum load of 3A)	Realy contact	3A, 30VDC, 250VAC

5.4.3 Analog outputs

No	Description	Type	Max input
4	Configurable analog outputs Outputs are internally power supplied from card revision B	+0-10VDC +2-10VDC +0-20mA +4-20mA	1k Ω 1k Ω 500 Ω 500 Ω

5.5 Communication

5.5.1 PC connection

No	Description	Type	Connection to PC
1	RS-232 connection for setup and drive log download	9-pole male D-sub	Null modem cable

5.5.2 Fieldbus connection

No	Description	Type	Connection
1	Connection for fieldbus module (optional module)	Profibus Modbus RTU ControlNet EtherNet IP ProfiNet DeviceNet Modbus TCP CC-link	

5.5.3 CAN connection

No	Description	Type	Connection
1	CAN connection for local system communication	4-pin Terminal	To Spider control panel card

6 Commissioning

6.1 Before commissioning

6.1.1 General

Read and understand this complete manual and all other attached technical documentation.
Visually check the unit for signs of damage.
Check that the serial number is in accordance with the attached Hägglunds order specific documentation.

6.1.2 Electrical

Before power on:
Check that the control system is connected according to the Hägglunds order specific documentation. Check for short circuit between ground and terminal pins.

With power on:
Check green indicators on the main board.
Check the function of electrical components and monitoring system manually. Instruments that cannot be actuated can be checked for correct wiring and if possible operated manually.
Check the tank oil level sensor and level indication when filling up the tank.
Check the interlock function for the electric motor(s).

6.3 At commissioning

With system speed regulation set OFF and without external load -Check that the required speed is reached. Fine adjustment of speed is done with pump output parameters Pox01 to POx04.

For further instructions about settings, see Spider data sheet (Engineering manual).

NOTICE

High output current can destroy pump control coil!

- If speed feedback is required – Set regulation ON and check speed step response, set regulator parameters for a smooth and stable regulation with external load.

6.2 After commissioning

Document any changes done during commissioning by updating documentation.
Download and save the parameter file.

Important: Store updated documents and parameter file centrally for future use at problem solving or functional change.

7 Maintenance

7.1 General maintenace

The Spider control system needs only minor maintenance. It is important to keep the inside and outside of Spider box tidy. Avoid excessive exposure to water, vapour and other materials that can cause short circuit, corrosion or abrasive wear.

7.2 Recommeded scheduled service

Inside the Spider box is mounted a VpCI emitter (Vapor phase Corrosion Inhibitor) to protect against oxidation. The emitter contains a pulverous substance and covers all components with a protective layer when the air inside the enclosure is saturated Life time after installation is two years, expiry date is shown on sticker beside the installed emitter. Item number for the emitter is R978980579 (1241 0001-001).

7.3 Available spare parts

Main circuit board, power supply and displays are some of the key spare parts available in case of a break down. Only trained personnel should perform repairs of the Spider. Contact your reseller for more information of repairs.

The Drive & Control Company

Rexroth
Bosch Group

Bosch Rexroth Mellansel AB
SE-895 80 Mellansel
Sweden
Tel. +46 (0) 660 870 00
Fax +46 (0) 660 871 60
documentation.mll@boschrexroth.se
www.boschrexroth.com/hagglunds

Your local contact can be found at:
www.boschrexroth.com/adresses

Printed in Sweden
RE 15330-WA/03.2015