LV-AP Pumping Smart Card

Product Compatibility

This expansion card is suitable for use with LV-AP soft starters.

Product description	Soft starter name
Basic model	*Not currently available*
Advanced model	LV-AP

Parameter Management

Parameter lists vary according to the model and version of soft starter.

Refer to the relevant soft starter literature for a complete parameter list.

For the latest manuals and software, please visit our website.

Contents

1   Disclaimer

The examples and diagrams in this manual are included solely for illustrative purposes. The information contained in this manual is subject to change at any time and without prior notice. In no event will responsibility or liability be accepted for direct, indirect or consequential damages resulting from the use or application of this equipment.

2   Warnings

WARNING

When the soft starter is connected to mains voltage, the Pumping Smart Card can start or stop the motor without warning. To ensure personnel safety, isolate the soft starter from mains voltage before installing the smart card.

WARNING

Inserting foreign objects or touching the inside of the starter while the expansion port cover is open may endanger personnel, and can damage the starter.

CAUTION

The hydraulic characteristics of pump systems vary considerably. The default parameter settings may not be suitable for every application and care should be taken to configure the starter appropriately.

3   Overview
3.1 Operation

The Pumping Smart Card provides dedicated inputs for pressure, depth, temperature and flow sensors to allow protection, control and monitoring integration in a range of pumping applications.

Monitoring

Data from analog or pulse sensors can be displayed directly on the soft starter's display. A real-time graph is also available if the optional remote keypad is installed.

Protection

The smart card can stop or trip the soft starter based on user-selected levels for high or low pressure, depth, temperature or flow.

Control

The smart card can automatically start and stop the soft starter in response to rising or falling pressure, or rising or falling depth.

Smart card control can be used in conjunction with the advanced model scheduling function to restrict starting or stopping to specified days and times.

4   Setup Procedure Overview

> ⚠ **WARNING**
> For your safety, isolate the soft starter from mains voltage before attaching or removing accessories.

4.1   Setup Procedure Overview

1. Insert the card into the soft starter.
2. Connect sensors to the inputs:
   - Depth protection: B13, B14 or C13, C14
   - Pressure protection: B23, B24 or C33, C34, C43, C44
   - Flow protection: B33, B34 or C23, C24
   - Motor temperature protection: R1, R2, R3
   - Pressure or depth based control: B23, B24
3. Configure the soft starter's auto-reset as required (parameters 12A *Auto-Reset Count*, 12B *Auto-Reset Delay*).
4. Configure flow protection operation if required (see Flow Protection on page 6).
5. Configure pressure protection operation if required (see Pressure Protection on page 10).
6. Configure pressure or depth based control if required (see Pressure Control on page 13).
   NOTE: Protection features will still operate even if control is set to Off.
7. Configure depth protection operation if required (see Depth Protection on page 17).
8. Configure temperature protection operation if required (see Thermal Protection on page 19).
9. Select the command source (parameter 1A *Command Source*):
   - For protection and monitoring, use Digital Input, Remote Keypad or Clock (advanced model only)
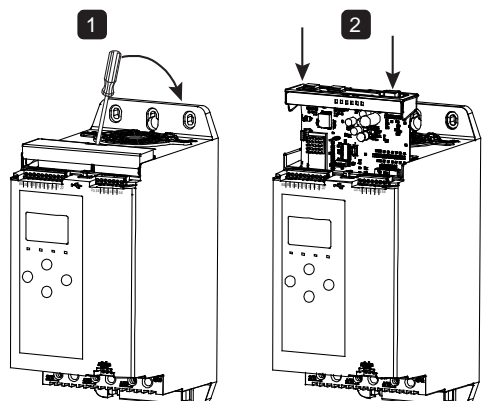   - For control, use Smart Card or Smart Card + Clock

> 📄 **NOTE**
> Parameter numbers for protection action settings 6L~6W differ slightly between basic model and advanced model.
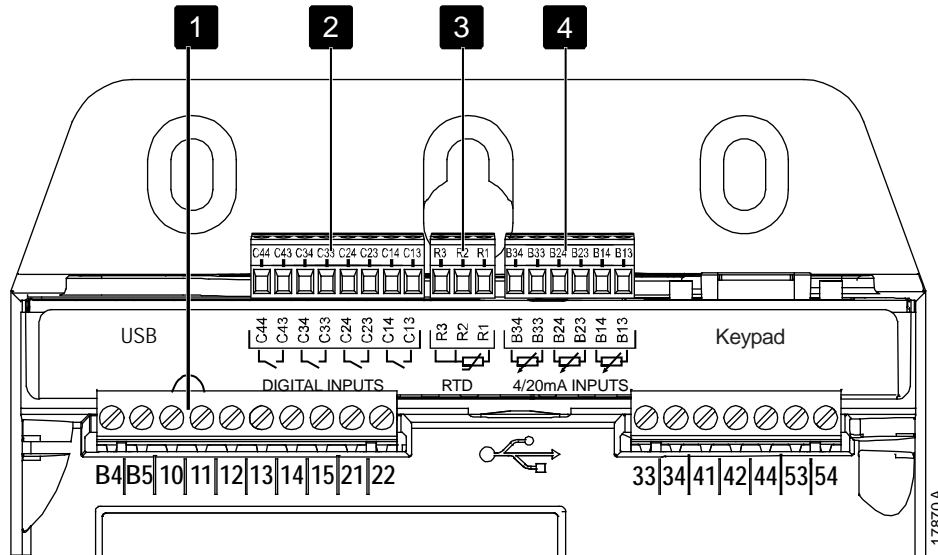
5   Installation

5.1   Installing the Expansion Card

1. Push a small flat-bladed screwdriver into the slot in the centre of the expansion port cover, and ease the cover away from the starter.
2. Line up the card with the expansion port. Gently push the card along the guide rails until it clicks into the starter.

5.2   Inputs

1	Reset input	10, 11	If the reset input is active, the starter will not operate. If a reset switch is not required, fit a link across terminals 10, 11 on the soft starter. The reset input is normally closed by default (see note).
2	Digital inputs (Normally open)	C13, C14	Depth protection
		C23, C24	Flow protection and monitoring
		C33, C34	Low pressure protection
		C43, C44	High pressure protection
3	RTD/PT100 input	R1, R2, R3	Motor temperature protection
4	4-20 mA inputs	B13, B14 [+]	Depth protection and monitoring
		B23, B24 [+]	Pressure protection and monitoring / Pressure or depth based control
		B33, B34 [+]	Flow protection and monitoring

> **NOTE**
> The reset input can be configured for normally open or normally closed operation. Use parameter 7I to select the configuration.

> **NOTE**
> Flow protection and monitoring:
> - When used with a switch sensor, C23, C24 provides flow protection only.
> - When used with a pulse sensor, C23, C24 provides flow protection and monitoring.

6   Operation

6.1   Monitoring

Data from analog or pulse sensors can be displayed directly on the soft starter's display.

A real-time graph is also available if the optional remote keypad is installed.

- To scroll to the graph screen, press the ▼ and ▲ buttons.
- To change which data is displayed on the graph, press the **GRAPHS** button on the remote keypad.

6.2   Protection and monitoring

The smart card can stop or trip the soft starter based on user-selected levels for high or low pressure, depth, temperature or flow.

Smart card protection features are always active while the soft starter is operating. Protection levels are set using parameter groups 13~17.

6.3   Protection, monitoring and control

The smart card can automatically start and stop the soft starter in response to rising or falling pressure, or rising or falling depth.

To use the Pumping Smart Card to control the soft starter:

- set parameter 1A *Command Source* to 'Smart Card' or 'Smart Card + Clock'
- set parameter 15A *Pressure Control Mode* as required
- to use clock-based scheduling, set parameter 4A *Auto-Start/Stop Mode* to 'Enable'

	NOTE
	Smart card protection features are always active while the soft starter is operating. Smart card protection is not affected by the command source.

	NOTE
	To use the smart card to control the soft starter, use sensors connected to B23, B24.

	NOTE
	If the reset input is active, the starter will not operate. If a reset switch is not required, fit a link across terminals 10, 11 on the soft starter.

7   Configuration

Operating parameters for the Pumping Smart Card are set in and stored in the soft starter. Parameters can be configured via the main menu, or uploaded using the USB Save & Load function.

For details on how to configure the soft starter, see the soft starter user manual.

7.1   Auto-Reset

The Pumping Smart Card can auto-reset trips, allowing normal operation to continue after the trip condition has passed.

⚠ **CAUTION**
Auto-reset may increase the starts per hour. To avoid damage to the starter or application, set the auto-reset delay carefully.

📋 **NOTE**
Auto-reset will reset trips from any source, not just from the smart card.

12A – *Auto-Reset Count*

Range:	0 – 5	**Default:**	0

Description: Sets how many times the soft starter will auto-reset, if it continues to trip.

The reset counter increases by one each time the soft starter auto-resets, and resets after a successful start.

Setting 12A to zero disables auto-reset.

12B – *Auto-Reset Delay*

Range:	0:05 - 30:00 (minutes:seconds)	**Default:**	5 seconds

Description: Sets a delay before the Pumping Smart Card will auto-reset a trip.
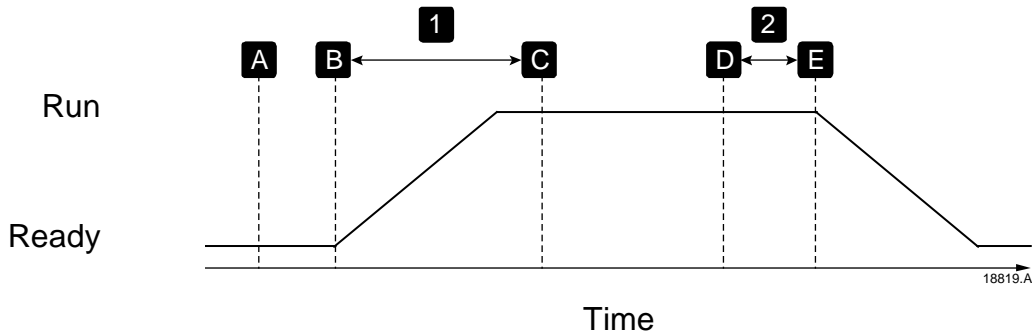
7.2   Flow Protection

Flow protection uses terminals B33, B34 or C23, C24 on the smart card.

- B33, B34: use an analog 4-20 mA sensor
- C23, C24: use a normally open digital switch sensor for protection only, or use a pulse sensor for protection and monitoring

Flow protection is active when the starter is in start, run or stop mode.

Operation

Time

A	Off (Ready)
B	Start signal
C	Flow protection active
D	Protection event (parameter 13A *High Flow Trip Level*, 13B *Low Flow Trip Level*)
E	Protection response (parameter 6M/6O *Flow Sensor*, 6Q/6S *High Flow*, 6R/6T *Low Flow*, 6S/6U *Flow Switch*)
1	Flow protection start delay (parameter 13C *Flow Start Delay*)
2	Flow protection response delay (parameter 13D *Flow Response Delay*)

To use an analog 4-20 mA sensor (protection and monitoring):

1. Connect the sensor to B33, B34
2. Set parameter 12G to 'Analog'
3. Set parameters 12H, 12I and 12J according to the sensor specification
4. Set parameters 13A ~ 13D and 6M/6O, 6Q/6S, 6R/6T as required

To use a switch sensor (protection only):

1. Connect the sensor to C23, C24
2. Set parameter 12G to 'Switch'
3. Set parameters 6M/6O, 6S/6U, 13C and 13D as required.
   Parameters 13A and 13B are not used with a switch sensor.

To use a pulse sensor (protection and monitoring):

1. Connect the sensor to C23, C24
2. Set parameter 12G to 'Pulses per minute' or 'Pulses per unit'
3. Set parameters 12H, 12M, and either 12K or 12L according to the sensor specification
4. Set parameters 13A ~ 13D and 6M/6O, 6Q/6S and 6R/6T as required

Parameters

- **Protection Actions (basic model)**

6M – *Flow Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the flow sensor.

6Q – *High Flow*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow exceeds the high flow trip level (parameter 13A).

6R – *Low Flow*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow falls below the low flow trip level (parameter 13B).

6S – *Flow Switch*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow sensor closes (switch type sensors only).

- **Protection Actions (advanced model)**

6O – *Flow Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the flow sensor.

6S – *High Flow*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow exceeds the high flow trip level (parameter 13A).

6T – *Low Flow*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow falls below the low flow trip level (parameter 13B).

6U – *Flow Switch*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the flow sensor closes (switch type sensors only).

- **Pump Input Configuration (basic model & advanced model)**

12G – *Flow Sensor Type*

Options:	None (default)	Pulses per minute
	Switch	Pulses per unit
	Analog	

Description: Selects which type of sensor is associated with the flow sensor input on the smart card.

12H – *Flow Units*

Options:	litres/second (default)
	litres/minute
	gallons/second
	gallons/minute

Description: Selects which units the sensor will use to report the measured flow.

12I – *Flow at 4 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 4 mA (0%) level of the flow sensor input.

12J – *Flow at 20 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 20 mA (100%) level of the flow sensor input.

12K – *Units per Minute at Max Flow*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the maximum flow volume of the flow sensor.

12L – *Pulses per Minute at Max Flow*

Range:	0 – 20000	**Default:**	0

Description: Calibrates the soft starter to the maximum flow volume of the flow sensor.

12M – *Units per Pulse*

Range:	0 – 1000	**Default:**	0

Description: Set to match how many units the flow sensor will measure for each pulse.

- **Flow Protection (basic model & advanced model)**

13A – *High Flow Trip Level*

Range:	0 – 5000	**Default:**	0

Description: Sets the trip point for high flow protection.

13B – *Low Flow Trip Level*

Range:	1 – 5000	**Default:**	5

Description: Sets the trip point for low flow protection.

13C – *Flow Start Delay*

Range:	00:00:50 - 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay before a flow protection trip can occur. The delay is counted from the time a start signal is received. The flow level is ignored until the start delay has elapsed.

13D – *Flow Response Delay*

Range:	00:00:10 - 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay between the flow passing the high or low flow trip levels, and the soft starter tripping.
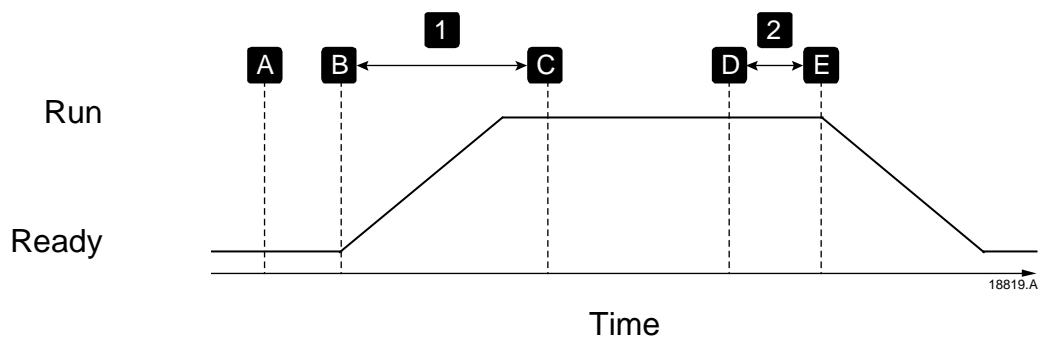
7.3   Pressure Protection

Pressure protection uses terminals B23, B24 or C33, C34, C43, C44 on the smart card.

- B23, B24: use an analog 4-20 mA sensor
- C33, C34 (Low pressure protection): use a normally open digital switch sensor
- C43, C44 (High pressure protection): use a normally open digital switch sensor

Pressure protection is active when the starter is in start, run or stop mode.

Operation

A	Off (Ready)
B	Start signal
C	Pressure protection active
D	Protection event (parameter 14A *High Pressure Trip Level*, 14D *Low Pressure Trip Level*)
E	Protection response (parameter 6L/6N *Pressure Sensor*, 6O/6Q *High Pressure*, 6P/6R *Low Pressure*)
1	Pressure protection start delay (parameter 14B *High Pressure Start Delay*, 14E *Low Pressure Start Delay*)
2	Pressure protection response delay (parameter 14C *High Pressure Response Delay*, 14F *Low Pressure Response Delay*)

To use an analog 4-20 mA sensor (protection and monitoring):

1. Connect the sensor to B23, B24
2. Set parameter 12C to 'Analog'
3. Set parameters 12D, 12E and 12F according to the sensor specification
4. Set parameters 14A ~ 14F and 6L/6N, 6O/6Q, 6P/6R as required

To use a switch sensor (protection only):

1. Connect the low pressure sensor to C33, C34 and the high pressure sensor to C43, C44
2. Set parameter 12C to 'Switch'
3. High pressure protection: Set parameters 6L/6N, 6O/6Q, 14B and 14C as required.
   Low pressure protection: Set parameters 6L/6N, 6P/6R, 14E and 14F as required.
   Parameters 14A and 14D are not used with a switch sensor.

Parameters

- **Protection Actions (basic model)**

6L – *Pressure Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the pressure sensor.

6O – *High Pressure*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the pressure exceeds the high pressure trip level (parameter 14A) or the high pressure switch sensor closes.

6P – *Low Pressure*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the pressure falls below the low pressure trip level (parameter 14D) or the low pressure switch sensor closes.

- **Protection Actions (advanced model)**

6N – *Pressure Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the pressure sensor.

6Q – *High Pressure*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the pressure exceeds the high pressure trip level (parameter 14A) or the high pressure switch sensor closes.

6R – *Low Pressure*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the pressure falls below the low pressure trip level (parameter 14D) or the low pressure switch sensor closes.

- **Pump Input Configuration (basic model & advanced model)**

12C – *Pressure Sensor Type*

Options:	None (default)
	Switch
	Analog

Description: Selects which type of sensor is associated with the pressure sensor input on the smart card.

12D – *Pressure Units*

Options:	Bar kPa (default) Psi

Description: Selects which units the sensor will use to report the measured pressure.

12E – *Pressure at 4 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 4 mA (0%) level of the pressure sensor input.

12F – *Pressure at 20 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 20 mA (100%) level of the pressure sensor input.

- **Pressure Protection (basic model & advanced model)**

14A – *High Pressure Trip Level*

Range:	0 – 5000	**Default:**	10

Description: Sets the trip point for high pressure protection.

14B – *High Pressure Start Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay before a high pressure protection trip can occur. The delay is counted from the time a start signal is received. The pressure is ignored until the start delay has elapsed.

14C – *High Pressure Response Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay between the pressure passing the high pressure trip level, and the soft starter tripping.

14D – *Low Pressure Trip Level*

Range:	0 – 5000	**Default:**	5

Description: Sets the trip point for high pressure protection.

14E – *Low Pressure Start Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay before a low pressure protection trip can occur. The delay is counted from the time a start signal is received. The pressure is ignored until the start delay has elapsed.

14F – *Low Pressure Response Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay between the pressure passing the low pressure trip level, and the soft starter tripping.

7.4 Pressure Control

The smart card can start or stop the starter (wake or sleep the pump) according to measured pressure. This can be used for direct pressure-based control, or the pressure measurement can be used to indicate water depth.

Other sensors can also be used to provide protection and monitoring.

Pressure control uses terminals B23, B24 on the smart card. Use an analog 4-20 mA sensor.

Configuration

1. Connect the sensor to B23, B24
2. Set parameter 12C to 'Analog'
3. Set parameters 12D, 12E and 12F according to the sensor specification
4. Set parameters 15A ~ 15E as required
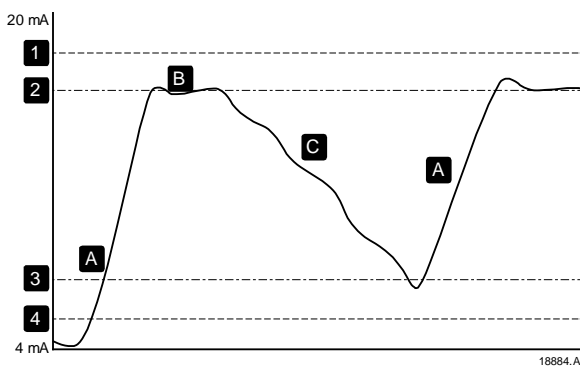5. Set parameter 1A to 'Smart Card' or 'Smart Card + Clock'.

Operation

- **Level control operation**

A pressure sensor can be used to control the pump based on fluid level in a storage tank, on the principle that deeper water exerts higher pressure on the sensor.

Set parameter 15A *Pressure Control Mode* to 'Falling Pressure Start' to fill the tank, or 'Rising Pressure Start' to empty the tank.

Example 1: Falling pressure (tank fill)   Example 2: Rising pressure (tank empty)
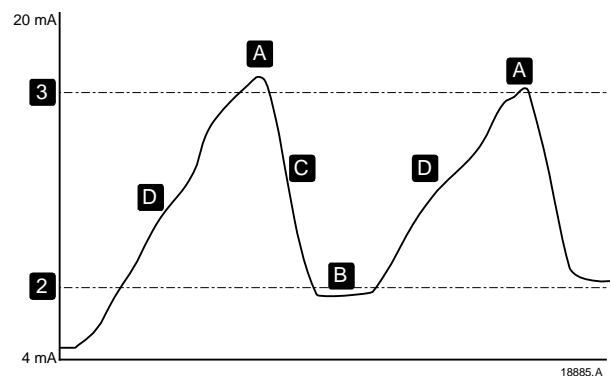
Time

Time

1	*High Pressure Trip Level* (parameter 14A)	**A**	Pump on (wake)
2	Pump sleep (*Stop Pressure Level* , parameter 15D)	**B**	Pump off (sleep)
3	Pump wake (*Start Pressure Level*, parameter 15B)	**C**	Falling fluid level
4	*Low Pressure Trip Level* (parameter 14D)	**D**	Rising fluid level

- **Pressure based operation**

18818. A

Time
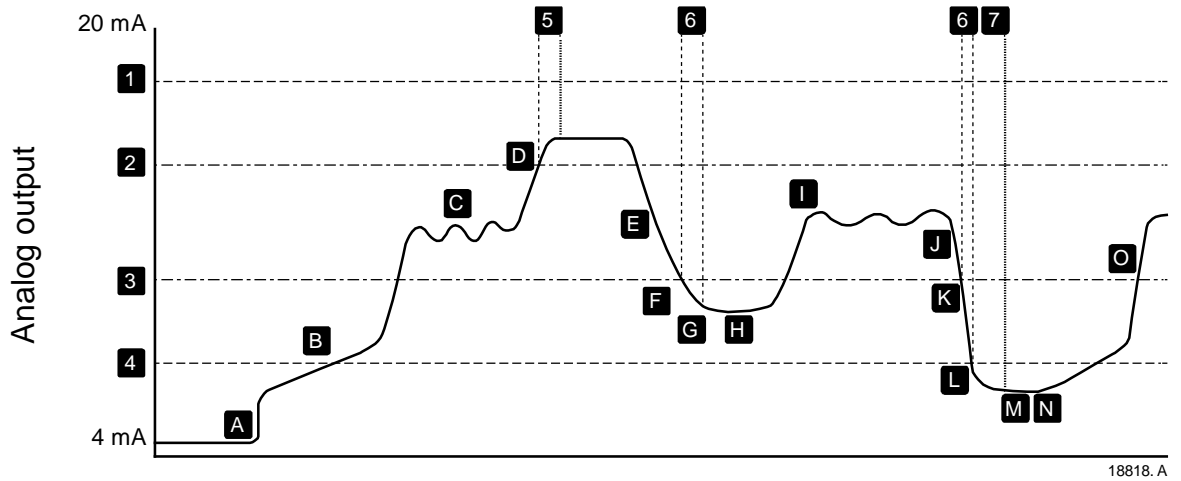
1	*High Pressure Trip Level* (parameter 14A)
2	Pump sleep (*Stop Pressure Level*, parameter 15D)
3	Pump wake (*Start Pressure Level*, parameter 15B)
4	*Low Pressure Trip Level* (parameter 14D)
5	*Stop Response Delay* (parameter 15E)
6	*Start Response Delay* (parameter 15C)
7	*Auto-Reset Delay* (parameter 12B)

A	Smart card control enabled, pump starts
B	Pipe filling
C	Normal pressure variation
D	Pressure at stop threshold, pump stops (sleep)
E	Falling system pressure
F	Pressure below start threshold, start response delay
G	Pump wakes
H	Pump running
I	Normal pressure variation
J	Falling system pressure
K	Pressure below start threshold, start response delay
L	Low pressure trip level
M	Soft starter auto-reset
N	Pump wakes
O	Normal operation

Parameters

- **Protection Actions (basic model)**

6L – *Pressure Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the pressure sensor.

- **Protection Actions (advanced model)**

6N – *Pressure Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the pressure sensor.

- **Pump Input Configuration (basic model & advanced model)**

12C – *Pressure Sensor Type*

Options:	None (default)
	Switch
	Analog

Description: Selects which type of sensor is associated with the pressure sensor input on the smart card.

12D – *Pressure Units*

Options:	Bar
	kPa (default)
	Psi

Description: Selects which units the sensor will use to report the measured pressure.

12E – *Pressure at 4 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 4 mA (0%) level of the pressure sensor input.

12F – *Pressure at 20 mA*

Range:	0 – 5000	**Default:**	0

Description: Calibrates the soft starter to the 20 mA (100%) level of the pressure sensor input.

- **Pressure Control (basic model & advanced model)**

15A – *Pressure Control Mode*

Options:	Off (default)	The Pumping Smart Card will not use the pressure sensor to control soft starting.
	Falling Pressure Start	The Pumping Smart Card will start when the pressure drops below the level selected in parameter 15B *Start Pressure Level*.
	Rising Pressure Start	The Pumping Smart Card will start when the pressure rises above the level selected in parameter 15B *Start Pressure Level*.

Description: Selects how the Pumping Smart Card will use data from the pressure sensor to control the motor.

15B – *Start Pressure Level*

Range:	1 – 5000	**Default:**	5

Description: Sets the pressure level to trigger the Pumping Smart Card to perform a soft start.

15C – *Start Response Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay between the pressure passing the pressure control start level, and the Pumping Smart Card performing a soft start.

15D – *Stop Pressure Level*

Range:	0 – 5000	**Default:**	10

Description: Sets the pressure level to trigger the Pumping Smart Card to stop the motor.

15E – *Stop Response Delay*

Range:	00:00:10 – 30:00:00 mm:ss:ms	**Default:**	0.5 seconds

Description: Sets a delay between the pressure passing the pressure control stop level, and the Pumping Smart Card stopping the motor.
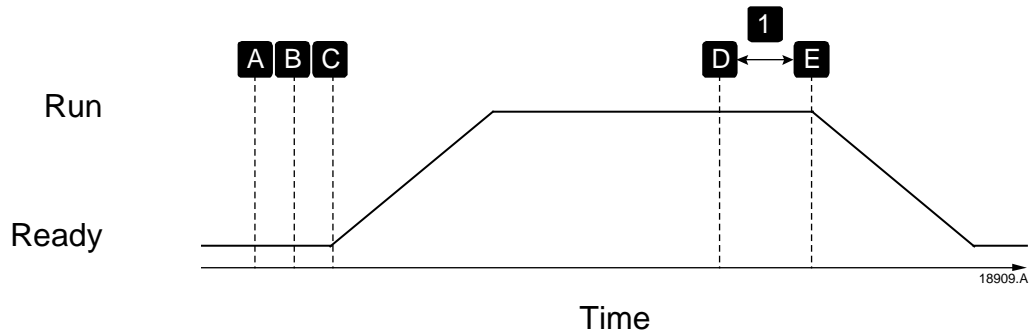
7.5   Depth Protection

Depth protection uses terminals B13, B14 or C13, C14 on the smart card.

- B13, B14: use an analog 4-20 mA sensor
- C13, C14: use a normally open digital switch sensor

Depth protection is always active (ready, start, run and stop modes).

Operation

Time

A	Off (Ready)
B	Depth protection active
C	Start signal
D	Protection event (parameter 16A *Depth Trip Level*)
E	Protection response (parameter 6N/6P *Depth Sensor*, 6T/6V *Well Depth*)
1	Depth protection response delay (parameter 16D *Depth Response Delay*)

To use an analog 4-20 mA sensor (protection and monitoring):

1. Connect the sensor to B13, B14
2. Set parameter 12N to 'Analog'
3. Set parameters 12O, 12P and 12Q according to the sensor specification
4. Set parameters 6N/6P, 6T/6V and 16A ~ 16D as required

To use a switch sensor (protection only):

1. Connect the sensor to C13, C14
2. Set parameter 12N to 'Switch'
3. Set parameters 6N/6P, 6T/6V, 16C and 16D as required.
   Parameters 16A and 16B are not used with a switch sensor.

Parameters

- **Protection Actions (basic model)**

6N – *Depth Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the depth sensor.

6T – *Well Depth*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the depth falls below the depth trip level (parameter 16A) or the depth switch sensor closes.

- **Protection Actions (advanced model)**

6P – *Depth Sensor*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if it detects a fault with the depth sensor.

6V – *Well Depth*

Options:	Soft Trip and Log (default)	Warn and Log
	Trip Starter	Log Only

Description: Selects the soft starter's response if the depth falls below the depth trip level (parameter 16A) or the depth switch sensor closes.

- **Pump Input Configuration (basic model & advanced model)**

12N – *Depth Sensor Type*

Options:	None (default)
	Switch
	Analog

Description: Selects which type of sensor is associated with the depth sensor input on the smart card.

12O – *Depth Units*

Options:	metres (default)
	feet

Description: Selects which units the sensor will use to report the measured depth.

12P – *Depth at 4 mA*

Range:	0 – 1000	**Default:**	0

Description: Calibrates the soft starter to the 4 mA (0%) level of the depth sensor input.

12Q – *Depth at 20 mA*

Range:	0 – 1000	**Default:**	0

Description: Calibrates the soft starter to the 20 mA (100%) level of the depth sensor input.

- **Depth Protection (basic model & advanced model)**

16A – *Depth Trip Level*

Range: 0 – 1000 **Default:** 5

Description: Sets the trip point for depth protection.

16B – *Depth Reset Level*

Range: 0 – 1000 **Default:** 10

Description: Sets the level for the Pumping Smart Card to auto-reset a depth trip.

16C – *Depth Start Delay*

Range: 00:00:10 – 30:00:00 mm:ss:ms **Default:** 0.5 seconds

Description: Sets a delay before a depth protection trip can occur. The delay is counted from the time a start signal is received. The depth input is ignored until the start delay has elapsed.

16D – *Depth Response Delay*

Range: 00:00:10 – 30:00:00 mm:ss:ms **Default:** 0.5 seconds

Description: Sets a delay between the depth passing the depth protection trip level, and the soft starter tripping.

7.6 Thermal Protection

Thermal protection uses terminals R1, R2, R3 on the smart card.

Thermal protection is active only when the starter is in run mode.

Parameters

- **Protection Actions (basic model)**

6U – *RTD/PT100 B*

Options: Soft Trip and Log (default) Warn and Log
Trip Starter Log Only

Description: Selects the soft starter's response to the protection event.

- **Protection Actions (advanced model)**

6W – *RTD/PT100 B*

Options: Soft Trip and Log (default) Warn and Log
Trip Starter Log Only

Description: Selects the soft starter's response to the protection event.

- **Thermal Protection (basic model & advanced model)**

17A – *Temperature Sensor Type*

Options: None (default)
PT100

Description: Selects which type of sensor is associated with the temperature sensor input on the smart card.

17B – *Temperature Trip Level*

Range: 0° – 240° **Default:** 40°

Description: Sets the trip point for temperature protection. Use parameter 10B *Temperature Scale* to configure the temperature scale.

8   Troubleshooting

8.1   Trip Messages

Display	Possible cause/Suggested solution
Depth Sensor	The smart card has detected a fault with the depth sensor. Related parameters: 6N/6P, 12N
Flow Sensor	The smart card has detected a fault with the flow sensor. Related parameters: 6M/6O, 12G
Flow Switch	The flow switch sensor (smart card terminals C23, C24) has closed. Related parameters: 6S/6U, 12G
High Flow	The flow sensor connected to the smart card has activated high flow protection. Related parameters: 6Q/6S, 12G, 12I, 12J, 13A, 13C, 13D
High Pressure	The pressure sensor connected to the smart card has activated high pressure protection. Related parameters: 6O/6Q, 12C, 12E, 12F, 14A, 14B, 14C
Low Flow	The flow sensor connected to the smart card has activated low flow protection. Related parameters: 6R/6T, 12G, 12I, 12J, 13B, 13C, 13D
Low Pressure	The pressure sensor connected to the smart card has activated low pressure protection. Related parameters: 6P/6R, 12C, 12E, 12F, 14D, 14E, 14F
Low Water	The depth sensor connected to the smart card has activated depth protection. Related parameters: 6T/6V, 12N, 12P, 12Q, 16A, 16B, 16C
Pressure Sensor	The smart card has detected a fault with the pressure sensor. Related parameters: 6L/6N, 12C
RTD Circuit	The smart card has detected a fault with the RTD sensor, or the RTD has activated temperature protection. Related parameters: 6U/6W, 17B

9   Specifications

Connections

External equipment   .... unpluggable connectors (supplied)

Maximum cable size .... 2.5 mm^2

Certification

CE .... EN 60947-4-2

RoHS .... Compliant with EU Directive 2011/65/EU