INSTRUCTION MANUAL

Profibus PA

A higher level of performance

HAWK

INTRODUCTION

CONTENTS

PROPRIETARY NOTICE
The information contained in this publication is derived in part from proprietary and patent data. This information has been prepared for the express purpose of assisting operating and maintenance personnel in the efficient use of the instrument described herein. Publication of this information does not convey any rights to use or reproduce it, or to use for any purpose other than in connection with the installation, operation and maintenance of the equipment described herein.

WARNING
This instrument contains electronic components that are susceptible to damage by static electricity. Proper *handling procedures must be observed during the removal, installation, or handling or internal circuit boards or devices.

* Handling Procedure:
1. Power to unit must be removed.
2. Personnel must be grounded, via wrist strap or other safe, suitable means, before any printed circuit board or other internal devices is installed, removed or adjusted.
3. Printed circuit boards must be transported in a conductive bag or other conductive container. Boards must not be removed from protective enclosure until the immediate time of installation. Removed boards must be placed immediately in a protective container for transport, storage, or return to factory.

Comments:
This instrument is not unique in its content of ESD (electrostatic discharge) sensitive components. Most modern electronic designs contain components that utilize metal oxide technology (NMOS, CMOS, etc.). Experience has proven that even small amounts of static electricity can damage or destroy these devices. Damaged components, even though they appear to function properly, exhibit early failure.

PATENT PENDING

PROFIBUS OVERVIEW

PROFIBUS is the fieldbus based automation standard from PI (PROFIBUS & PROFINET International).
It offers comprehensive solutions encompassing actual communication, application profiles, system integration and engineering.

The GSD is a file written according to the ISO 15745 standard and supplies all information necessary to specify the cyclic Input/Output communication with a PROFIBUS master and for the configuration of the PROFIBUS network. The GSD file alone is sufficient to specify the cyclic I/O data exchange of measured values and manipulated variables between field device and automation system.

Profibus PA uses Manchester-encoded Bus Powered (MBP) 2-wire technology which combines the functions of data transmission and power supply. Like conventional 4-20 mA or HART communication technologies, fieldbus technology supports the simultaneous transmission of power and communication data via a single cable, even in potentially explosive atmospheres.

Connection between PROFIBUS DP and a PROFIBUS PA segment is accomplished using segment couplers or DP/PA links.
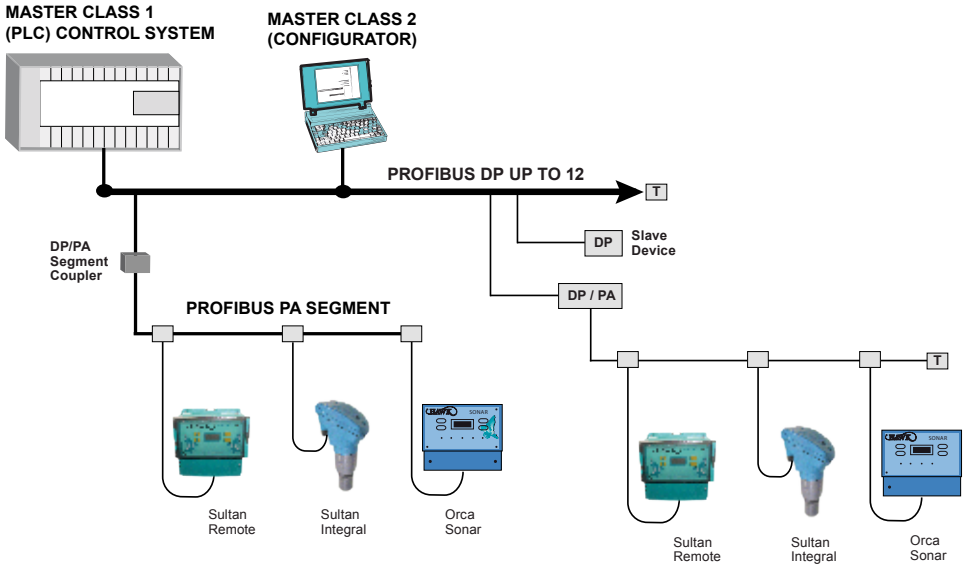
GSD / DRIVER SETUP

Do not connect the Hawk Profibus PA unit to your network unit until you have performed the following steps.

1. Ensure you have the latest driver ZIP file from **http://www.hawklevel.com** downloads / drivers section.

2. Unzip full contents of ZIP file into one directory (for example Program Files\Hawk)

3. Copy the **manufacturer.csv** file from the ZIP file and over write the existing manufacturer.csv file located at C:\Programme or Program Files\SIEMENS\STEP7\S7BIN\manufacturer.csv

4. Install the HAWK0D1E.GSD file into your PA network control software.

5. Connect and apply power to only **ONE** instrument. This should now be detected as a Hawk device. The default bus address of all Hawk PA units is **126**. If you connect more than one unit in its factory default state you will have communication problems.

6. Change the bus address to your desired number.

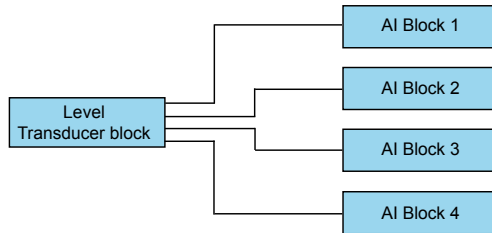7. Connect the next unit and repeat as per above.

SYSTEM DIAGRAM

Profibus System Consolidation

**MASTER CLASS 1
(PLC) CONTROL SYSTEM**

**MASTER CLASS 2
(CONFIGURATOR)**

PROFIBUS DP UP TO 12

T

**DP/PA
Segment
Coupler**

DP | **Slave
Device**

DP / PA

PROFIBUS PA SEGMENT

T

Sultan
Remote

Sultan
Integral

Orca
Sonar

Sultan
Remote

Sultan
Integral

Orca
Sonar

BLOCK DIAGRAM

Hawk device function block application

```
                                      ┌─────────────┐
                                   ┌──│ AI Block 1  │
                                   │  └─────────────┘
                                   │  ┌─────────────┐
                                   ├──│ AI Block 2  │
   ┌──────────────┐                │  └─────────────┘
   │    Level     │────────────────┤  ┌─────────────┐
   │Transducer block│              ├──│ AI Block 3  │
   └──────────────┘                │  └─────────────┘
                                   │  ┌─────────────┐
                                   └──│ AI Block 4  │
                                      └─────────────┘
```
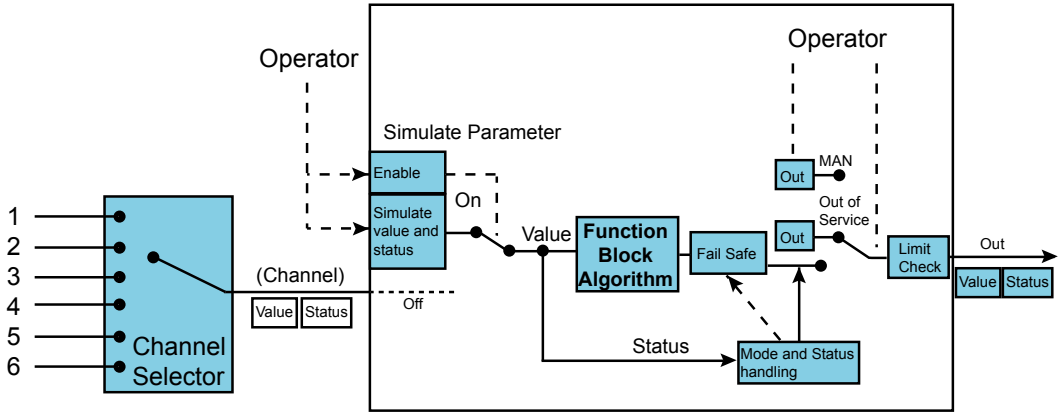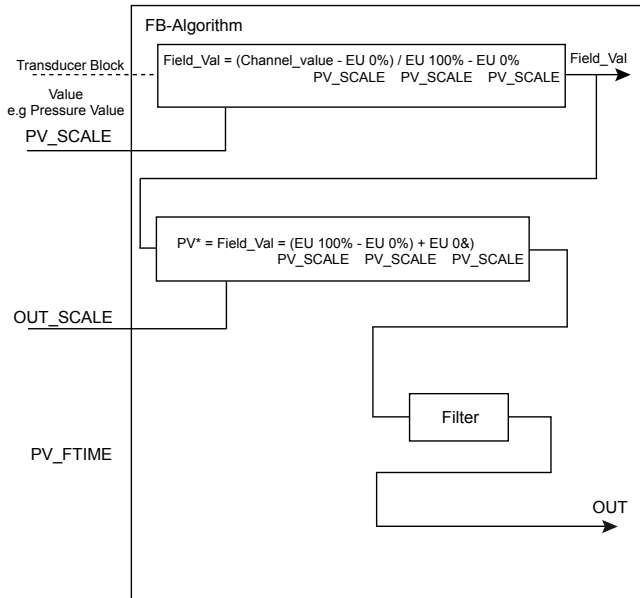
Level Transducer Block
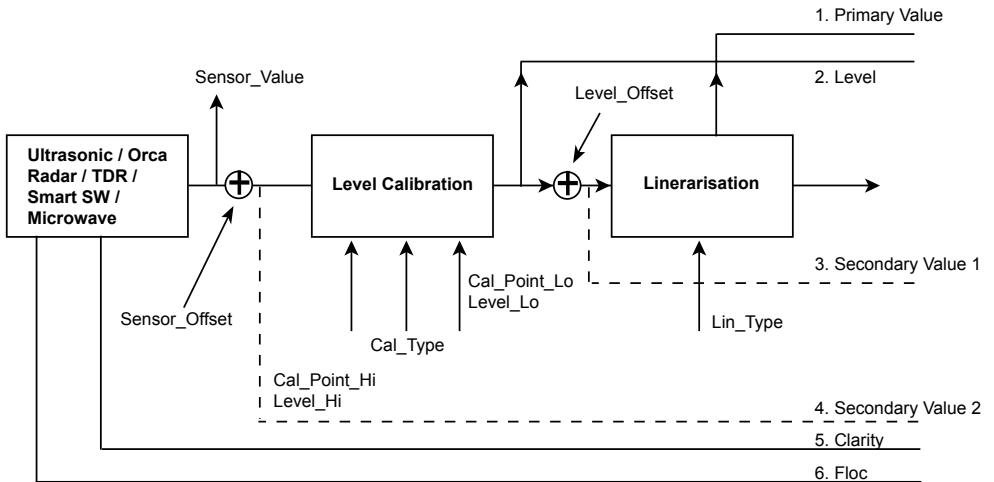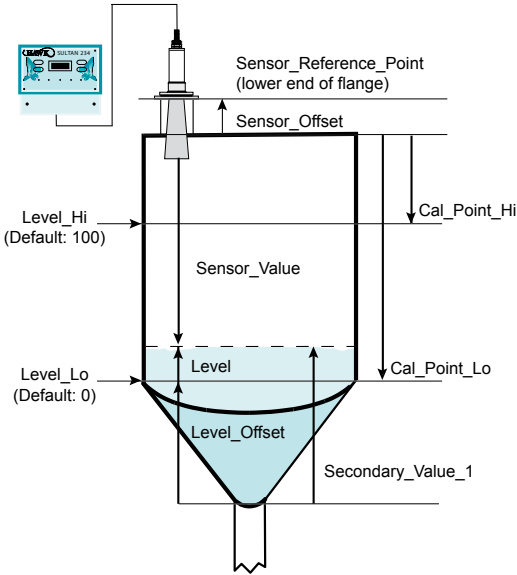
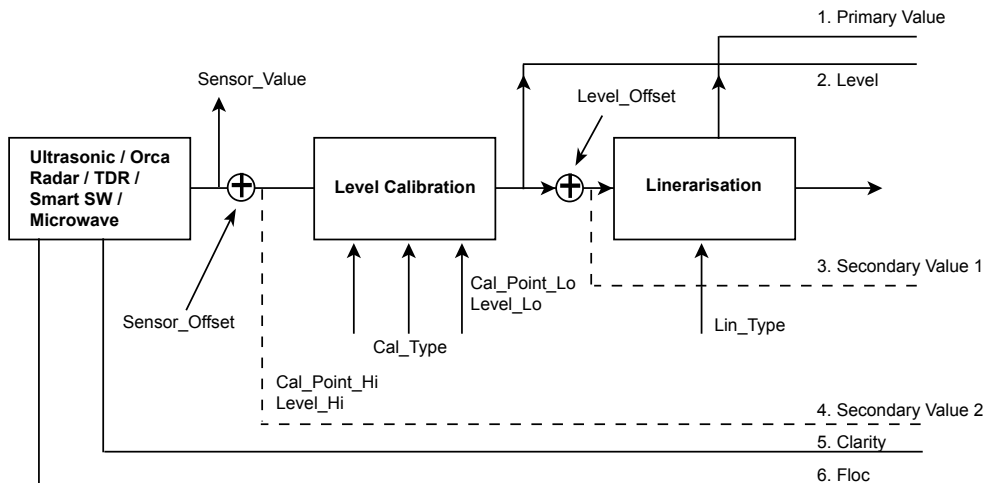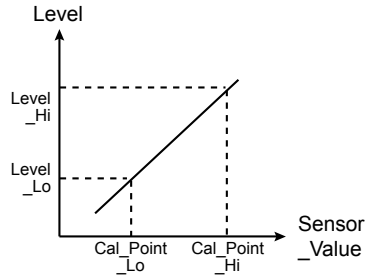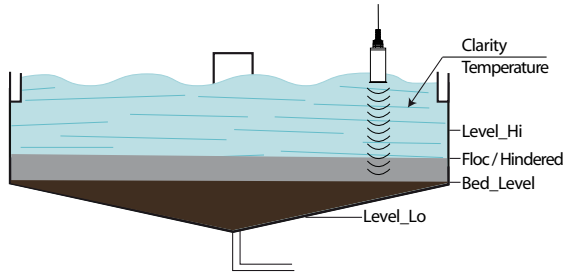# BLOCK DIAGRAM

AI Block

Function Block Algorithm

PARAMETER LIST

Application Examples

Level

Sensor_Reference_Point
(lower end of flange)

Sensor_Offset

Level_Hi
(Default: 100)

Sensor_Value

Cal_Point_Hi

Level_Lo
(Default: 0)

Level

Cal_Point_Lo

Level_Offset

Secondary_Value_1

Thickener / Clarifier

Clarity
Temperature

Level_Hi
Floc / Hindered
Bed_Level

Level_Lo

Level

Level
_Hi

Level
_Lo

Sensor
_Value

Cal_Point
_Lo

Cal_Point
_Hi

Sensor_Value

Level_Offset

1. Primary Value

2. Level

Ultrasonic / Orca
Radar / TDR /
Smart SW /
Microwave

Level Calibration

Linerarisation

3. Secondary Value 1

Sensor_Offset

Cal_Type

Cal_Point_Lo
Level_Lo

Lin_Type

Cal_Point_Hi
Level_Hi

4. Secondary Value 2

5. Clarity

6. Floc

PARAMETER LIST

Parameter Information

• Primary value:	This is the Process value (Transducer Output) after linearization and offsets, with status of transducer block
• Primary value Unit:	Unit used for Primary value output
• Level:	Sensor Value after level calibration and sensor offset
• Level unit:	Unit used for Level Value
• Sensor value:	This is actual Sensor value
• Sensor unit:	Unit used for sensor value
• Secondary value 1:	This is Level value after level offset
• Secondary value unit	
• Secondary value 2:	This is Sensor value after Sensor Offset
• Secondary value unit	
• Lin type:	This is the switch to select the type of linearization, Lin type = 0 , No Linearization Lin type = 1 , 32 point Table method for Linearization
• Level Hi:	Level Hi is highest value level can take
• Level Lo:	Level Lo is lowest value level can take
• Temperature:	It is the process temperature value

Channel Mapping Information:

Hawk devices support 4 AI blocks and each block can have different inputs selectable by channels. There are 6 channels available in Hawk devices, described as below

1. Channel 1 : Primary Value
2. Channel 2 : Level
3. Channel 3 : Secondary value 1
4. Channel 4 : Secondary Value 2
5. Channel 5 : Clarity*
6. Channel 6 : Floc*

• Output value only valid for Orca sonar

TROUBLESHOOTING

FAULT FINDING

Test Steps

1. What is the voltage at device Bus terminals? 9-32V.

2. What is the current in device Bus loop? 22mA for Orca or Sultan234, 20 mA for Sultan2.

3) What comms are selected in Output Adj Menu? FF.

4) What is amplifier software version? 5.68 onwards (displayed during unit power up).

Unit Detected But Not Transmitting Data or Data Read Failed

Check if the Modbus device ID is set to 1 - using the keypad hit CAL, 'unlock 0' will be displayed, hit CAL again. 'Quickset' will not be displayed. Press the arrow keys to scroll till you see 'Output Adj'. Press CAL to select. Use the arrow keys to scroll until you see 'comms type'. Press CAL to edit, use the arrows to locate 'Modbus'. Press CAL again to select. The next screen will display the Modbus ID. If this is not 1 press CAL to edit and use the arrows to change it to 1 - press CAL to save.

Repeat this procedure except now set the 'comms type' back to FF/PA.

FF/PA reads the unit parameters (such as level values) via Modbus - Modbus must be set to ID1.

Repair Service / Field Service / Pre-maintenance

Hawk provides customers with excellent after-sales service to guarantee the ongoing functioning and support of our products.

Should you need to access our Repairs facilities, please submit a Return Material Authorisation form and follow the procedure as described within the form. This Form can also be downloaded from our website within the 'downloads' section.

www.hawkmeasure.com

SPECIFICATIONS

Profile Revision
• Version 3.0

Operating Voltage
• 9 - 32Vdc

Protocols Supported
• **DP-V0** specifies basic functionality of
the PROFIBUS protocol. In particular, this
includes cyclic Input/Output communication
and diagnostic reporting.
• **DP-V1** adds optional functions for cyclic
communication and alarm handling (en-
hancements to diagnostic reporting) to the
PROFIBUS protocol.

Standards:
• IEC 61158   • IEC 61326
• IEC 61784   • IEC 61010-1
• IEC 61131   • IEC 60079.27

Output Signal:
• Signal: Profibus
• Transmission speed : 31.25KB
• Current : 20mA default and can be
switched to from 15mA, 20mA, 25mA,
30mA

Function Blocks
• 1 physical block
• 4 analog input function blocks
• 1 transducer block

Physical layer is according to IEC 61158-2

Cable
• According to Profibus standard

Channel Mapping
• Channel 1: Primary Value
• Channel 2: Level
• Channel 3: Secondary value 1
• Channel 4: Secondary Value 2
• Channel 5: Clarity*
• Channel 6: Floc*
  *Output value only valid for Orca sonar

Manchester Encoded Bus Powered Features
• Transfer rate: 31.25 kbps
• Transmission technology:
• Half duplex, synchronous, self clocking,
with Manchester biphase L encoding
• CRC (cyclic redundancy check)
• Data security: Preamble, failsafe start-end
delimiters
• Cable: Shielded, twisted pair line (type A
or type B)
• Topology: Line and tree topology with
termination; combined topology possible
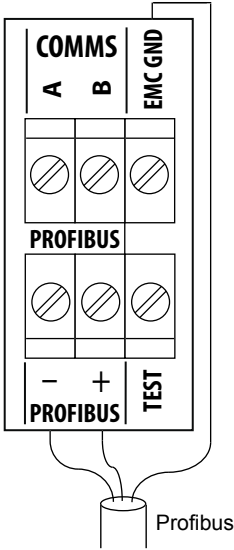
Drivers Provided
• G.S.D file for Master Class 1 comms
• E.D.D.L file for Master Class 2 comms

IMPORTANT
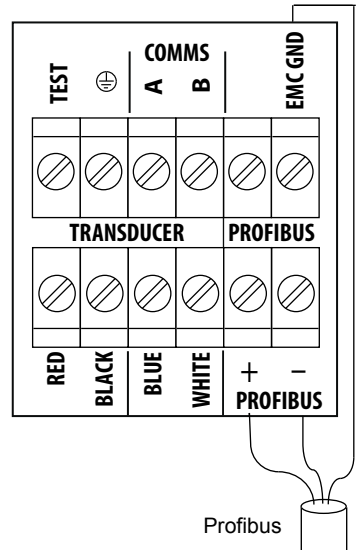**"USE SPECIFIED CABLE ONLY"**

WIRING TERMINALS

Profibus Powered

Sultan 2 wire Profibus PA Transmitter
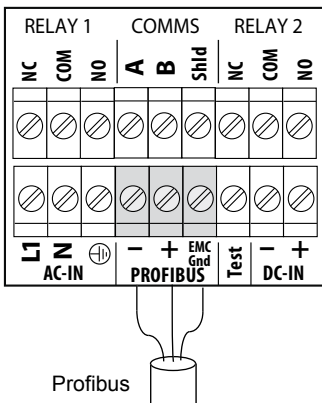Integral Version

Sultan 2 wire Profibus PA Transmitter
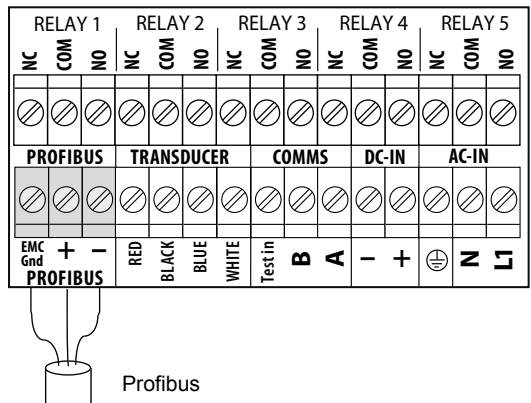Remote Version

Externally Powered

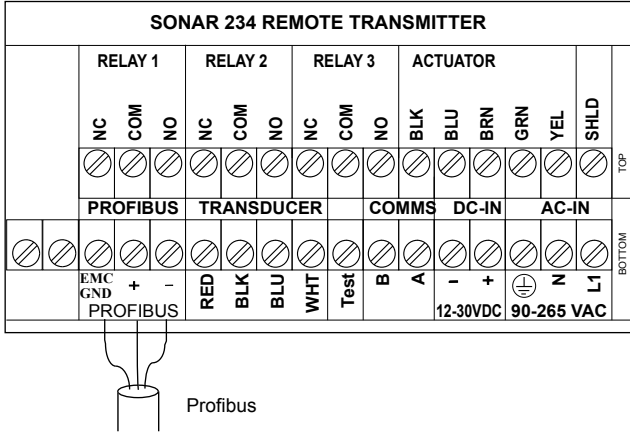Sultan 234 wire Profibus PA Transmitter
Integral Version

Sultan 234 wire Profibus PA Transmitter
Remote Version

WIRING TERMINALS

Externally Powered

Orca Profibus PA Transmitter

SONAR 234 REMOTE TRANSMITTER														
	RELAY 1			RELAY 2			RELAY 3			ACTUATOR				
	NC	COM	NO	NC	COM	NO	NC	COM	NO	BLK	BLU	BRN	GRN	YEL	SHLD

TOP

PROFIBUS			TRANSDUCER					COMMS		DC-IN		AC-IN		
EMC GND	+	–	RED	BLK	BLU	WHT	Test	B	A	–	+	⊕	N	L1

BOTTOM

PROFIBUS   12-30VDC   90-265 VAC

Profibus

DECLARATION OF CONFORMITY

PROFIBUS PA

PROFIBUS is the fieldbus based automation standard from PI (PROFIBUS & PROFINET International).

It offers comprehensive solutions encompassing actual communication, application profiles, system integration and engineering.

Hawk Measurement Systems Pty Ltd provides the Generic Station Description.

The **GSD** is a file written according to the ISO 15745 standard and supplies all information necessary to specify the cyclic Input/Output communication with a PROFIBUS master and for the configuration of the PROFIBUS network. The GSD file alone is sufficient to specify the cyclic I/O data exchange of measured values and manipulated variables between field device and automation system.

Hawk Devices Use PA Profile Revision 3.0

Hawk Devices Support the following protocol level defined by Profibus:

- **DP-V0** specifies basic functionality of the PROFIBUS protocol. In particular, this includes cyclic Input/Output communication and diagnostic reporting.
- **DP-V1** adds optional functions for acyclic communication and alarm handling (enhancements to diagnostic reporting) to the PROFIBUS protocol.

Hawk Devices are designed to be compliant with the following standards:

- **IEC 61158**
- **IEC 61784**
- **IEC 61131**
- **IEC 61326**
- **IEC 61010-1**
- **IEC 60079.27**

Go to http://www.profibus.com/index.php?id=55 to view Hawk Measurement Systems membership.

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Latest version on www.hawkmeasure.com

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