

Before Use

DUX02357 Series for PROFINET

Installation and Maintenance Manual




Thank you for purchasing an SMC DUX02357 Series Fieldbus device (Hereinafter referred to as "SI unit").

Please read this manual carefully before operating the product and make sure you understand its capabilities and limitations. Please keep this manual handy for future reference.

To obtain the Operation Manual about this product and control unit, please refer to the SMC website (www.smcusa.com) or contact SMC directly.

Safety Instructions


These safety instructions are intended to prevent hazardous situations and/or equipment damage. Read this manual before using the product, to ensure correct handling, and read the manuals of related apparatus before use. Keep this manual in a safe place for future reference. This product is class A equipment intended for use in an industrial environment. There may be potential difficulties in ensuring electromagnetic compatibility in other environments due to conducted as well as radiated disturbances. These instructions indicate the level of potential hazard with the labels of "Caution", "Warning" or "Danger". They are all important notes for safety and must be followed in addition to International Standards (ISO/IEC) and other safety regulations.


 <b>Caution:</b>	CAUTION indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 <b>Warning:</b>	WARNING indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.
 <b>Danger:</b>	DANGER indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.

Operator

- ◆ This Installation and Maintenance manual is intended for those who have knowledge of machinery using pneumatic equipment, and have sufficient knowledge of assembly, operation, and maintenance of such equipment. Only those persons are allowed to perform assembly, operation, and maintenance.
- ◆ Read and understand this operation manual carefully before assembling, operating, or providing maintenance to the product.

Safety Instructions

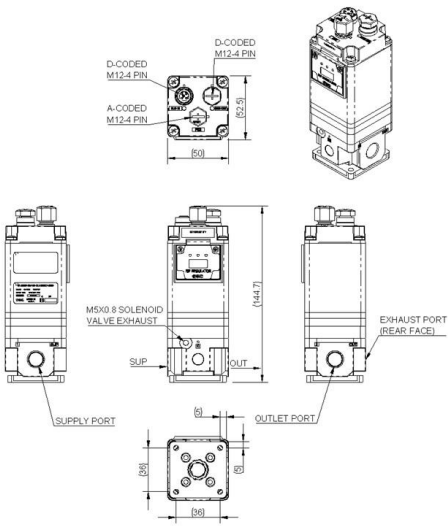
 Warning
<ul style="list-style-type: none"><li>• <b>Do not disassemble, modify (including changing the printed circuit board) or repair.</b> An injury or failure can result.</li></ul>
<ul style="list-style-type: none"><li>• <b>Do not operate the product outside of the specifications.</b> Do not use for flammable or harmful fluids. Fire, malfunction, or damage to the product can result. Verify the specifications before use.</li></ul>
<ul style="list-style-type: none"><li>• <b>Do not operate in an atmosphere containing flammable or explosive gases.</b> Fire or an explosion can result. This product is not designed to be explosion proof.</li></ul>
<ul style="list-style-type: none"><li>• <b>If using the product in an interlocking circuit:</b><ul style="list-style-type: none"><li>• Provide a double interlocking system, for example a mechanical system.</li><li>• Check the product regularly for proper operation.</li></ul>Otherwise malfunction can result, causing an accident.</li></ul>
<ul style="list-style-type: none"><li>• <b>The following instructions must be followed during maintenance:</b><ul style="list-style-type: none"><li>• Turn off the power supply.</li><li>• Stop the air supply, exhaust the residual pressure, and verify that the air is released before performing maintenance.</li></ul>Otherwise an injury can result.</li></ul>
<ul style="list-style-type: none"><li>• <b>The compatibility of pneumatic equipment is the responsibility of the person who designs the pneumatic system or decides its specifications.</b> Since the products specified here can be used in various operating conditions, their compatibility with the specific pneumatic system must be based on specifications or after analysis and/or tests to meet specific requirements.</li></ul>
<ul style="list-style-type: none"><li>• <b>Only trained personnel should operate pneumatically operated machinery and equipment.</b> Compressed air can be dangerous if an operator is unfamiliar with it. Assembly, handling or repair of pneumatic systems should be performed by trained and experienced personnel.</li></ul>
<ul style="list-style-type: none"><li>• <b>Do not service machinery/equipment or attempt to remove components until safety is confirmed.</b> Inspection and maintenance of machinery/equipment should only be performed after confirmation of safe locked-out control positions. When equipment is to be removed, confirm the safety process as mentioned above. Switch off air and electrical supplies and exhaust all residual compressed air in the system. Before machinery/equipment is re-started, ensure all safety measures to prevent sudden movement of cylinders etc. (Supply air into the system gradually to create back pressure, i.e. incorporate a soft-start valve).</li></ul>
<ul style="list-style-type: none"><li>• <b>Do not use this product outside of the specifications. Contact SMC if it is to be used in any of the following conditions:</b><ul style="list-style-type: none"><li>• Conditions and environments beyond the given specifications, or if the product is to be used outdoors.</li><li>• Installations in conjunction with atomic energy, railway, air navigation, vehicles, medical equipment, food and beverage, recreation equipment, emergency stop circuits, press applications, or safety equipment.</li><li>• *An application, which has the possibility of having negative effects on people, property, or animals, requiring special safety analysis.</li></ul></li></ul>

 Caution
<ul style="list-style-type: none"><li>• <b>After maintenance is complete, perform appropriate functional inspections.</b> Stop operation if the equipment does not function properly. Safety cannot be assured in the case of unexpected malfunction.</li></ul>
<ul style="list-style-type: none"><li>• <b>The surface on the product may be hot.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Provide grounding to assure the noise resistance of the Fieldbus system.</b> Individual grounding should be provided close to the product with a short cable.</li></ul>
<ul style="list-style-type: none"><li>• <b>This product is pre-set at the factory and must not be dismantled by the user. Contact your local SMC office for advice.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Ensure, when installing this product, that it is kept clear of power lines to avoid noise interference.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Ensure that load surge protection is fitted when inductive loads are present (i.e. solenoid, relay etc.).</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Ensure precautions are in place if the product is used in a 'free flow output' condition. Air will continue to flow continuously.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Do not use a lubricator on the input side of this product. If lubrication is necessary, place the lubricator on the 'output' side.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Ensure all air is exhausted from the product before maintenance.</b></li></ul>
<ul style="list-style-type: none"><li>• <b>Length of connector cable shall be 10 m maximum.</b></li></ul>

NOTE

- When conformity to UL is necessary the SI unit must be used with a UL1310 Class 2 power supply.

Summary of Product Element



ITV20XX Drawing

Element	Description
Supply port connection	Input Pressure Line Connection (X010, X030, X050) / Atmosphere Pressure (2090) *1
Outlet port connection	Output Pressure Line Connection (X010, X030, X050) / Application Vacuum Line Connection (2090) *1
Exhaust / vacuum port	Exhaust Port (X010, X030, X050) / Vacuum Line Connection (2090) *1
LED display window	Network and operating status LEDs *2
Fieldbus interface connector (BUS IN)	PROFINET connection PORT 1 (M12 4-pin socket, D-coded) *3
Fieldbus interface connector (BUS OUT)	PROFINET connection PORT 2 (M12 4-pin socket, D-coded) *3
Power supply connector (PWR)	24 Volt DC input power supply (M12 4-pin plug, A-coded) *3
Seal caps (Accessory)	Seal cap for unused Fieldbus interface connector (BUS OUT); seal cap for unused power supply connector *3

\*1: X is 1, 2, or 3 and designates the body type for the ITV.  
\*2: See **LED Indicators** section for the LED indication.  
\*3: See the **Accessories** section in the Operation Manual for connecting cables and seal cap part numbers.


Installation

Connecting cables

Select the appropriate cables to mate with the connectors mounted on the SI unit. The M12 connector cables have two types, SPEEDCON compatible and non-compatible. If both plug and socket sides have connectors for SPEEDCON, the cable can be inserted and connected by turning it a 1/2 of a rotation, leading to reduction in work hour. A non-compatible connector can be connected to a compatible connector as well as an M12.

Power supply connector layout


Power supply connector layout - PWR: M12 4-pin Plug A-coded connector

	No.	Designation	Description
	1	+24 VDC	Power (Brown Wire or "+" terminal)
	2	-	Do Not Connect
	3	0 VDC	Common (Blue Wire or Common or "-" terminal)
	4	-	Do Not Connect

**NOTE:** The wire colors above are for a standard SMC power cable. Power cables from other sources may use different colors. For Power Cable selection, see **Accessories** section in the Operation Manual.

Fieldbus interface connector layout

Network BUS IN and BUS OUT: M12 4-pin socket D-coded connectors

	No.	Designation	Description
	1	TD+	Transmit Data +
	2	RD+	Receive Data +
	3	TD-	Transmit Data -
	4	RD-	Receive Data -

**NOTE:** Use a standard industrial Ethernet cable. Connect "BUS IN" to the upstream device and connect the "BUS OUT" to the downstream device. For fieldbus cable selection see **Accessories** section in the Operation Manual.

Setting

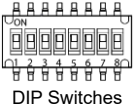
Configuration

In order to configure the SI unit for the PROFINET network, the appropriate device master file (GSD file) for the SI unit will be required.

Technical documentation giving detailed configuration information and the GSD file can be found on the SMC website (www.smcusa.com).


GSDML file: GSDML-V\*.\*\*-SMC-DUX02357-\*\*\*\*\*.xml

Switch Setting



Device Name

The PROFINET ITV contains an 8 circuit DIP switch to configure the ITV Device Name. Typically, the DIP switches do not need to be changed from their factory setting, but the following describes how to assign the default Device Name. When power is first applied to PROFINET devices with factory settings, the Device Name is "DUX02357-SPN" and the IP address is set to 0.0.0.0. The user can choose an empty default Device Name, a default name of "DUX02357-SPN", or a default name of with a unique identifier (for example "DUX02357-SPN-15"). The unit is shipped with all switches in the "ON" state which will provide a default Device Name of "DUX02357-SPN". DIP switches are only read at power up. If a change to the DIP switches is required then power down the unit, make the change to the DIP switches, and reapply power. Also, any persisted Device Name stored in memory will take precedence over the DIP switches. If the user wishes to use the DIP switch settings and a persisted Device Name is already stored, then a factory reset to clear the name will need to be performed to erase the stored name.











 Caution
<ul style="list-style-type: none"><li>• <b>Changing the Device Name switches requires the removal of 2 screws in the front panel of the unit. Take care as the panel hinges to a maximum of 90 degrees.</b></li><li>• <b>After setting the Device Name, always close and fix the panel securely. Tighten the screws to torque of 0.6 – 0.8 N·m.</b></li></ul>

Switch	Title	Description
1	Default Device Name	The position of switch 1 determines whether to use a default Device Name in the event there is no name stored in persisted memory. In the default ON position, the device uses the default string of "DUX02357-SPN" for the name if there is no Device Name stored in persisted memory. In order to use this position, the persisted Device Name must be cleared. The "DCP Set/Reset" service can be used to perform a factory reset to clear the name from memory. In the OFF position, the device will only use the name saved in persistent memory. If no name is currently stored, then an empty character string (") will be used as the default setting. The "DCP Set" service can be used to set the name of the device in the persisted memory.
2	Append Suffix	The position of switch 2 is used in conjunction with switch 1. If switch 1 is in the ON position, then switch 2 can be used to append a suffix number on the default "DUX02357-SPN" Device Name to uniquely identify the device. In the ON position, the device will only use the default Device Name described for switch 1 ("DUX02357-SPN"). In the OFF position, the device will append a hyphen and a numeric suffix to the default name ("DUX02357-SPN-XXX"). The numeric suffix is described for switches 3 through 6 (see below).
3 – 6	Suffix Number	Switches 3 through 6 uniquely identifies the device when the default Device Name is used. If all switches are in the OFF position, then a zero (0) is appended after the hyphen. If all switches are in the ON position, then a fifteen (15) is appended after the hyphen. The numeric suffix can be calculated with the following equation where n is the switch number: $\sum_{i=1}^n (Switch\ Position\ for\ i) \times 2^{(n-i)}$
7 - 8	Not Used	In the ON position, the Switch Position is a "1" and in the OFF position, the value is "0".

LED Indication




Front LED Indicators



LED	LED Status	Description
PWR		OFF Load voltage for the ITV is not supplied.
		Green ON Load voltage for the ITV is supplied and within range.
		Green/Red ON Load voltage for the ITV is outside the tolerance range (24 VDC ±10%) or data integrity value is corrupt.
BF		Red ON Load voltage for the ITV is outside the critical range (24 VDC - 15%).
		OFF The ITV operating voltage is not supplied or no error.
		Red flashing No data exchange with controller (possible device name not assigned).
SF		Red ON No configuration or low speed physical link or no physical link.
		OFF The ITV operating voltage is not supplied or no error.
		Red flashing DCP Set Signal service is initiated via the bus.
SF		Red ON Watchdog timeout; channel, generic or extended diagnosis present; system error.

Top LED Indicators

BUS IN  BUS OUT 

LED	LED Status	Description
Bus In / Bus Out		Off Load voltage not supplied, terminal is not connected to another operating device, or terminal failed
Bus In / Bus Out		Green ON Terminal is connected to another operating device
Bus In / Bus Out		Yellow Flashing Intermittently blink yellow - data transfer in progress

Communication Data Allocation

Cyclic Data

Cyclic messages are periodically exchanged between the device and the controller.

Output to ITV

Data	Description	Length	Units
Pressure Setpoint	Pressure to set ITV to (Full Scale consist of 12 bits or a maximum value of 4095)	2 bytes	Counts

Input from ITV

Data	Description	Length	Units
Pressure	Actual device pressure (scaled) (bytes 0-1)	2 bytes	Counts
Diagnostic Flags	(bytes 2-3)	2 bytes (byte.bit)	
	Setpoint Error	1 bit (0.0)	N/A
	Setpoint Values out of range - If Setpoint greater than 120% full scale	1 bit (0.1)	N/A
	Clear Zero Error	1 bit (0.2)	N/A
	Not going zero within a timely manner	1 bit (0.3)	N/A
	Pressure Error	1 bit (0.4)	N/A
	Output Pressure Greater the 120% full scale	1 bit (0.5)	N/A
	Non-volatile Data Error	1 bit (0.6)	N/A
	Configuration data was corrupt and needed to restore defaults	1 bit (0.7)	N/A
	Pressure Window Error	1 bit (0.8)	N/A
	Not within setpoint and sensitivity in timely manner	1 bit (0.9)	N/A
	Not Used	1 bit (1.0)	N/A
	Integrity Error	1 bit (1.1)	N/A
	Memory Corruption Check	1 bit (1.2)	N/A
	Not Used	1 bit (1.3)	N/A
	System Fault	1 bit (1.4)	N/A
	Bus Fault	1 bit (1.5)	N/A
	Voltage Fault	1 bit (1.6)	N/A
	Voltage out of range (Nominal is 24 VDC ±10%)	1 bit (1.7)	N/A
	Miswiring Fault	1 bit (1.8)	N/A
	Not Used	4 bits (1.4 through 1.7)	N/A

Acyclic Data

Acyclic messages are useful for programmatically setting or configuring the ITV.

Output to ITV

Index	Data	Description	Length	Units
1	Pressure Setpoint	Pressure to set ITV to (Full Scale consist of 12 bits or a maximum value of 4095)	2 bytes	Counts
2	Application Configuration	Used for configuring the device	2 bytes	Refer to the <b>Application Configuration</b> section
3	User Gain	Refer to the <b>User Gain</b> section in the Operation Manual	2 bytes	Refer to <b>Configuring the In-range Window</b> section in the Operation Manual
4	User Sensitivity	Refer to the <b>User Sensitivity</b> section in the Operation Manual	2 bytes	Refer to <b>Configuring the In-range Window</b> section in the Operation Manual

○ Input from ITV

Index	Returned Data	Description	Length	Units
1	Scaled Pressure	Scaled pressure	2 bytes	Counts
2	Unscaled Pressure	Unscaled A/D pressure	2 bytes	Counts
3	Diagnostic Flags		2 bytes (byte.bit)	N/A
	Setpoint Error	Setpoint Values out of range - If Setpoint greater than 120% full scale	1 bit (0.0)	N/A
	Clear Zero Error	Not going zero within a timely manner	1 bit (0.1)	N/A
	Pressure Error	Output Pressure Greater than 120% full scale	1 bit (0.2)	N/A
	Non-volatile Data Error	Configuration data was corrupt and needed to restore defaults	1 bit (0.3)	N/A
	Pressure Window Error	Not within setpoint and sensitivity in timely manner	1 bit (0.4)	N/A
	Integrity Error	Memory Corruption Check	1 bit (0.6)	N/A
	System Fault	Catastrophic system issue	1 bit (1.0)	N/A
	Bus Fault	Catastrophic communication issue	1 bit (1.1)	N/A
	Voltage Fault	Voltage out of range (Nominal is 24 VDC ±10%)	1 bit (1.2)	N/A
	Miswiring Fault	Indication of external sensor miswiring	1 bit (1.3)	N/A
4	Supply Voltage	Power supplied to the device	2 bytes	Engineering units 10x volts (xx.x) (Example 24.2v equal 242)

○ Application Configuration

Bit	Description
bit 0	Hold on connection loss
bit 1	POE Enable
bit 2	Enable Engineering units
bit 3	Not Used
bits 7-4	Engineering Unit Type
	Refer to the <b>Engineering Unit Types</b> section

○ Engineering Unit Types

Type	Hex	Bits 7 - 4
MPa	0x0	0000
kg/cm²	0x1	0001
bar	0x2	0010
psi	0x3	0011
kPa	0x4	0100
Counts	0x5	0101

Diagnostics

○ Alarms

The ITV contains alarms for an indication of a problem. This data is sent to the PLC as alarms as well as part of the cyclic data.

Index	Title	Description	Extended Channel Diagnosis (Units)
256	Setpoint Error (Input Signal Error)	Setpoint Values out of range - If Setpoint greater than 4095 counts	N/A
257	Clear Zero Error	Not going zero within a timely manner.	N/A
258	Pressure Error	Over or under maximum and minimum pressure.	N/A
259	Non-volatile Data Error (Flash Configuration Data Error)	Configuration data was corrupt and needed to restore defaults.	N/A
260	Pressure Window Error	Not within setpoint and sensitivity in timely manner.	N/A
261	Not Used		
262	Integrity Error	Memory Corruption Check	N/A
263	Not Used		
264	System Fault	Catastrophic system issue	N/A
265	Bus Fault	Catastrophic communication issue	N/A
266	Voltage Fault	Voltage out of range (Nominal is 24.0 VDC ±10%)	Volts (decimal)
267	Miswiring Fault	Indication of external sensor miswiring	N/A

**NOTE:** When an alarm is set, the SI unit will send an alarm message to the master as diagnostic information and the SF Red LED will turn ON.

Troubleshooting

Technical documentation giving detailed troubleshooting information can be found on the SMC website (www.smcusa.com).

Outline Dimensions

Technical documentation giving detailed outline dimensions information can be found on the SMC website (www.smcusa.com).

Accessories

Technical documentation giving detailed accessories information can be found on the SMC website (www.smcusa.com).



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