

Operation Manual Excelon Plus Integrated Electronic Pressure Sensor (IEPS)







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General information

About these instructions

These instructions will enable you safely to set up and operate the Excelon Plus Integrated Electronic Pressure Sensor (IEPS). They are an integral part of the product and must be accessible to personnel. Personnel must carefully read and understand these instructions before starting work of any kind. Following all of the safety and handling instructions contained in this manual is a requirement for safe working.

Explanation of symbols

Safety notice



DANGER!

This symbol and the word 'danger' indicates an immediately dangerous situation that may result in serious injury or death if not avoided.

WARNING!

This symbol and the word 'warning' indicates a potentially dangerous situation that may result in serious injury or death if not avoided.

CAUTION!

This combination of symbol and signal word indicates a possibly hazardous situation that may result in damage to property or environmental damage if it is not avoided.

Indicates tips and other useful information.

Liability and warranty

Physical modification to the Excelon Plus Integrated Electronic Pressure Sensor may only be carried out by the manufacturer's personnel. Repairs or servicing beyond the scope of the activities described in these instructions may only be carried out by the manufacturer or by persons who have been expressly authorised and trained by the manufacturer. Failure to observe this will void the warranty. The manufacturer accepts no liability for damages incurred.



Warranty statement

Items sold by NORGREN LTD are warranted to be free from defects in materials and workmanship for a period of two years from the date of manufacture, provided said items are used according to NORGREN LTD'S recommended usages. NORGREN LTD'S liability is limited to the repair of, refund of purchase price paid for, or replacement in kind of, at NORGREN LTD'S sole option, any items proved defective, provided the allegedly defective items are returned to NORGREN LTD prepaid. The warranties expressed above are in lieu of and exclusive of all other warranties. There are no other warranties, expressed or implied, except as stated herein. There are no implied warranties of merchantability or fitness for a particular purpose, which are specifically disclaimed. NORGREN LTD'S liability for breach of warranty as herein stated is the exclusive remedy, and in no event shall NORGREN LTD be liable or responsible for incidental or consequential damages, even if the possibility of such incidental or consequential damages has been made known to NORGREN LTD. NORGREN LTD reserves the right to discontinue manufacture of any product or change product materials, design, or specification without notice. Our policy is one of continuous research and development. We therefore reserve the right to amend without notice the specification given in this document. Customers are responsible for ensuring that the product is used only for the purpose of which it is intended. In case of doubt Norgren will be pleased to advise.

Safety

This section provides an overview of all the major safety aspects for the protection of people and for safe, fault-free operation. Further task-related safety notices appear in sections on transportation, installation, checks before initial operation and maintenance.

Important instructions



WARNING!

Read the Excelon Plus Installation & Maintenance Instructions!

Before proceeding further, read the Excelon Plus Installation and Maintenance Instructions (document 13911-C01) that were supplied with the product. Failure to do so may result in serious injury or death.

Scan the QR code or visit https://www.imi-precision.com/excelon-plus



Intended use

The Excelon Plus Integrated Electronic Pressure Sensor is an electronic pressure monitoring device integrated with the Excelon Plus air preparation range. It is intended for pneumatic applications where the monitoring of gauge pressures up to 10 bar is required.



Do not use for safety applications



Do not use for safety applications!

WARNING!

This product is not intended for use in safety applications. Do not rely on indicated values for safety purposes. Ensure that pressure is shut off and systems are depressurised before performing any work.

Power supply



WARNING! Power source to be compliant with EN 61010-1!

To ensure safe operation the product should be used with a power source that is a limited energy supply within the meaning of EN 61010-1, and that meets the requirements of EN 61010-1 or an equivalent safety standard. Failure to do so could result in fire or electrical shock hazards.

Misuse



WARNING! Dangerous if misused!

- Incorrect use can create dangerous situations.
- This unit does not have ATEX approval.
- Do not use in areas where an explosive atmosphere may be present.
- Do not use as a safety-critical component.
- Do not use these products where pressures and temperatures can exceed those listed under Technical Data.

Not for use where an explosive atmosphere may be present



DANGER!

Not to be used where an explosive atmosphere may be present!

- This unit does **NOT** have ATEX approval.
- Do **NOT** use in areas where an explosive atmosphere may be present.



Use recommended lubricants



WARNING!

Use only recommended lubricants!

Use only Norgren recommended lubricants (document en_8_900_935)

General dangers

This section lists residual risks which may be present even if the product is used correctly.

Compressed air



WARNING!

Danger of injury caused by compressed air!

Compressed air can cause injuries if not handled correctly.

- Ensure systems are depressurized before work begins.
- Have all work carried out by pneumatics specialists.

Personnel requirements



WARNING! Danger of injury caused by lack of training!

People who lack the proper training cannot assess the risk when handling the Excelon Plus Integrated Electronic Pressure Sensor and related parts.

- Have all work on the pneumatic system carried out by pneumatics specialists.
- Have all electrical installation work carried out by qualified electricians.

Pneumatics specialist

Pneumatics specialists are trained for the specialist area that they work in, and they know the relevant standards and regulations.

Because of their special training and experience, pneumatics specialists can carry out work on pneumatic, electropneumatic and mechatronic systems and identify and avoid risks by themselves.

Qualified electrician

Qualified electricians are specially trained for the area they work in, and they know the relevant standards and regulations.



Because of their specialist training, knowledge and experience, and their knowledge of relevant standards and regulations, qualified electricians can carry out work on electrical installations and identify and avoid risks by themselves.



Personal protective equipment

While carrying out work of various kinds on and with the air preparation parts, personnel must wear personal protective equipment (PPE) which is referred to in the individual sections in these instructions.

For all work, always wear:



Protective clothing

Protective clothes are heat-resistant and closefitting clothes with low tear strength, close-fitting sleeves and without any parts sticking out.



Safety shoes

Safety shoes protect the feet from crushing, falling parts and slipping on slippery surfaces.

For special activities, wear:



Protective gloves

Protective gloves protect the hands and forearms against contact heat and sharp objects.



Safety goggles

Safety goggles protect the eyes from flying objects and splashing liquids.



Ear protection

Ear protection protects the ears from damage caused by exposure to noise.



Description of operation

The Integrated Electronic Pressure Sensor (IEPS) is a pressure sensor with condition monitoring and diagnostic functionality. It provides a clear digital display with colour changing background for condition monitoring. It has IO-Link functionality and configurable digital output.









Specifications

Technical data	
Specification	Value
Medium	Compressed air only
Operating pressure	0 10 bar (0 145 psi)
Proof pressure	14 bar
Ambient and medium temperature	Transparent bowl: -10 +60°C (+14 +140°F) Metal bowl: -20 +65°C (-4 +149°F) Air supply must be dry enough to avoid ice formation at temperatures below +2°C (+35°F) Contact our technical service for use below +2°C
Storage temperature	As operating temperature
Shock and vibration	According to EN 60068-2-6 15g, 11ms, 3 shocks each axis 10-150Hz, 0.35mm / 50m/s ² , 20 sweeps each axis
Degree of protection	IP40
Electrical parameters	
Repeatability	≤0.1% of full scale (FS) at stable temperature
Accuracy (total error over temperature)	≤1.5% (0°C to 50°C) ≤2.5% (-20°C to 65°C)
Units	Pressure: bar, psi, MPa Temperature: °C, °F Voltage: V
Process data update rate	1Hz
Display	1.44" Full colour TFT LCD
Electrical connection	M8 x 1
Power supply	18-30 V d.c
Current consumption	< 20mA (outputs not active)
Electromagnetic compatibility	According to EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN 61000-4-6, EN 61000-6-3
Communications protocol	IO-Link revision V1.1

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Bitrate: COM2 Minimum cycle time: 20ms SIO mode support: No Block parametrization: Yes Data storage: Yes

Switching output

Load current

Product drawings

100mA with short circuit protection

Configurable NPN / PNP / Push-Pull / normally high / normally low / high impedance (hi-Z)

Please see the datasheets for product drawings.

Q84G - ???

B84G - http://cdn.norgren.com/pdf/en_8_200_350_B84G.pdf // Data Sheet: 8_200_350_B84G

R84G - http://cdn.norgren.com/pdf/en 8 200 250 R84G.pdf // Data Sheet: 8_200_250_R84G



Installation

Pneumatic connection

The Excelon Plus Integrated Electronic Pressure Sensor (IEPS) is supplied integrated into a regulator, filter regulator or as a stand-alone device. Follow the installation instructions provided with the product that you purchased. These are contained in the Excelon Plus Installation and Maintenance Instructions (document 13911-C01) sheet that was supplied with your product.

Improper pneumatic connection



DANGER!

Danger of injury caused by improper connection!

Faulty pneumatic connections can impair the safe operation of the Integrated Electronic Pressure Sensor and may cause injuries during operation.

- Follow the instructions provided in the Excelon Plus Installation and Maintenance Instructions (document 13911-C01) sheet that was supplied with your product.
- Scan the QR code or visit <u>https://www.imi-precision.com/excelon-plus</u>



Compressed air



WARNING!

Danger of injury caused by compressed air!

Compressed air can cause injuries if not handled correctly.

• Make sure the system is depressurised before work begins.

Personnel:

• Pneumatics specialist

Protective equipment:

- Safety goggles
- Protective gloves



Sealing



An airtight compressed air system helps to save energy, which protects the environment.

Electrical connection

Improper electrical connection



DANGER!

Danger of injury caused by improper connection!

Danger of death through contact with live components. When switched on, electrical components can perform uncontrolled movements and result in serious injury.

• Isolate the electrical supply before starting work and make sure it cannot be switched back on.

Personnel:

• Qualified electrician

Protective equipment:

- Safety goggles
- Protective gloves



Electrical connector

All electrical connections are made via the M8, 4 pin connector plug.

Electrical connector pins looking into the mating face

2 4	Pin-No.	Function
	1	+24V DC supply
	2	DO – digital switching output
	3	0V common
1 3	4	CQ – IO-Link data
	2 3 4	DO – digital switching ou 0V common CQ – IO-Link data

Electrical connection for pressure switch operation

Before installation ensure that all power supplies, PLC input and output cards are locked in their OFF position. Only suitably qualified personnel should attempt installation and all health and safety standards should be adhered to.

It is recommended that M8 sensor cables be used to make the connection, e.g. NC-084FS-124MS-1: see the list of cables and accessories at the end of this document for additional part numbers. Refer to the cable specification for details of the core colours and connections.

Connect the 24V power supply to pin 1 (+ve) and pin 3 (-ve common). The electrical supply should not exceed 30V to avoid damaging the product. The 24V power source should be capable of supplying at least 30mA.

Connect the signal from pin 2 to the PLC controller input. Configure the output of the Integrated Electronic Pressure Sensor (IEPS) to conform to the controller input type. The instructions are provided below.



WARNING!

Power source to be compliant with EN 61010-1!

To ensure safe operation the product should be used with a power source that is a limited energy supply within the meaning of EN 61010-1, and that meets the requirements of EN 61010-1 or an equivalent safety standard. Failure to do so could result in fire or electrical shock hazards.

Electrical connection for IO-Link operation

The principal use of the Excelon Plus IEPS is for it to be operated with an IO-Link master.

Before installation ensure that all power supplies to the IO-Link master, PLC input and output cards are locked in their OFF position. Only suitably qualified personnel should attempt installation and all health and safety standards should be adhered to.

It is recommended that M8 IO-Link cables be used to make the connection, e.g. NC-084FS-124MS-1: see the list of cables and accessories at the end of this document for additional part numbers. Select a cable of appropriate length and with an appropriate connection for the IO-Link master. The IEPS is intended to be used with IO-Link class A ports, with pin 2 set to a digital input to monitor the switching



output. It may also be used with class B ports if the switching output is not required, in which case the switching output should be configured to high impedance mode.

Connect the female M8 connector on the cable to the IEPS. Connect the male connector to the IO-Link master port.



Ensure connectors are clean and free of debris before making the connection.

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General operation

The Excelon Plus IEPS is a pressure gauge / monitor with a configurable switching output. It can be configured using IO-Link or the screen and buttons on the device. When connected to an IO-Link master, the IEPS will provide continuous pressure readings and on-demand diagnostic data to a factory automation system, such as a PLC. To prevent tampering, the screen and buttons can be locked out.

When values are to be changed using the screen and buttons, the display will change colour to black and white to indicate it is in edit mode. Otherwise the IEPS remains in gauge mode, where it monitors according to the settings.

Operating elements: display and buttons



Display fields

•	The Digital Out "DO" indicator will show when the digital output is active, i.e. when the pressure is outside the acceptable limits that have been set.
	The IQ Link estive indicator "IQL" will blink when the IQL into

• The IO-Link active indicator "IOL" will blink when the IO-Link communications channel is active.





Background colours

The display background changes colour to indicate:

- pressure is within limits
- pressure is outside limits
- a fault state, or
- the IEPS is ready for user input from the buttons.

Background colour			
Gau	ge mode – monitoring pre	ssure	Edit mode
Green	Amber	Red	White
Pressure normal (inside the set limits).	A fault condition exists. The scrolling message offers advice to correct the fault.	Pressure outside the set limits.	The scrolling message offers advice on next steps.
IMI One	IMI One	IMI One	IMI One
0.00	0.00	0.00	0.00
BARG	BARG	BARG	BARG
Scrolling Message	Scrolling Message	Scrolling Message	Scrolling Message
Setpoint 0.00	Setpoint 0.00	Setpoint 0.00	Setpoint 0.00
Tolerance 0.00	Tolerance 0.00	Tolerance 0.00	Tolerance 0.00

Guidance messages on the display

A scrolling message on the display provides guidance regarding actions that can be taken, and messages regarding any errors, warnings or faults that may occur during operation.

- **NOTE**: feedback in response to user actions indicating the IEPS's state or configuration, e.g. buttons are disabled message when user presses a button.
- **ERROR**: feedback in response to user actions indicating a problem with their actions or input data.



- **WARNING**: feedback in response to an external event that may affect the IEPS, e.g. overpressure, under-voltage
- **FAULT**: feedback indicating a fault with the device's hardware or software components, displayed when the fault is detected, e.g. pressure sensor fault.



Fault and warning messages will remain on the display until cleared by holding the middle button to enter PIN mode, even after the cause of the message has been resolved. This is to ensure that the message has been noted.

• Default PIN: 0000

Menu operation

Gauge mode – monitoring pressure

When the IEPS is powered on it will immediately start monitoring. The screen will change colour depending on the parameter settings. The menu items and values can be viewed by using the **Scroll** buttons but cannot be edited. This is referred to as **gauge mode** in these instructions.



Edit mode

Press **Select** to move from the read-only gauge mode to the edit mode. A PIN must be entered. The screen changes to black and white with the active menu item highlighted. Basic instructions are displayed in a scrolling message.





You will be prompted to enter a pin when you select Edit mode. The PIN can be viewed and changed in Edit mode or by using an IO-Link configuration tool. A PIN can be automatically reset to the default value by using a configuration tool to perform a factory reset, but it cannot be reset at the gauge. Choose a PIN that you will not forget or record it in a secure place.

Default PIN: 0000

After a correct PIN has been entered, the device will be in edit mode. Press Select to edit menu item value or press Scroll arrows to move to next menu item. When Select is pressed, a cursor highlights the first digit for modification.



Press the Scroll arrows to change the value of the highlighted digit or press Select to move to the next digit. When you have finished editing the values, press Set (press and hold the circle button for 1second) to return to the edit mode.



Scroll to the next menu item or press Set again to return to gauge mode. The IEPS will automatically exit menu mode and return to gauge mode after 30-seconds, if there is no button activity. . In this event, no changes will be saved.

Menu options

Some of the menu items can be edited to configure the IEPS (editable), others provide information only and cannot be changed.

Menu item	Editable (e) or information (i)	Description
21 Subject to ch	ange without no	otice 13997-C01



Setpoint	е	The target pressure for the process, in units of pressure.
Tolerance	e	The pressure range about the setpoint that is acceptable (acceptable pressure = setpoint \pm tolerance), in units of pressure.
Hysteresis	e	The degree by which the acceptable pressure range is reduced after the pressure has exceeded the setpoint \pm tolerance range. The IEPS will not consider the pressure to have returned to an acceptable level until it is within: setpoint \pm (tolerance – hysteresis). This prevents the output / display oscillating between acceptable / unacceptable when the pressure is near a boundary value. Units of pressure.
PresUnits	е	The units of pressure measurement: bar, psi or MPa.
TempUnits	е	The units of temperature: °C or °F.
Rotation	e	0° or 180°. Allows display and button function to be rotated so that a regulator can be mounted upside-down. NOTE: DO NOT MOUNT FILTER-REGULATORS UPSIDE-DOWN, the filter will not function unless the bowl is in the correct orientation.
DOType	e	Sets the digital output to NPN, PNP or PP (push-pull). Push-pull outputs can drive either NPN or PNP inputs but cannot be combined with other signals.
DONormal	e	Normally high (HIGH) or normally low (LOW). Indicates the state of the digital output when pressure is in the acceptable range (assuming that the output is correctly connected for NPN / PNP / PP operation). High impedance (hi-Z). In high impedance state the pin does not drive any signal and may be connected to active pins if necessary.
PIN	е	Shows current PIN. Change this to a new PIN. This item will only appear in Edit mode.
Hrs Run	i	Number of hours the unit has been powered since last powered on or reset.
Days Total	i	Total number of days that the unit has been powered.
Voltage	i	The voltage of the power supply measured by the unit.
Temp	i	The temperature seen by the sensor in the unit. This is typically higher than ambient because of power dissipation from the active electronics.
Version	i	Software version.

0

The values that can be used for setpoint, tolerance and hysteresis are limited by the software:



- 10 bar (145 psi, 1.0 MPa) > Setpoint > tolerance > hysteresis > 0
- Setpoint + tolerance < 14 bar (145 psi, 1.0 MPa)
- Setpoint tolerance > 0 bar (0 psi, 0 MPa)



Menu Map





Configuration

The full parameter set is detailed in the following sections in a format that enables them to be used with and without the IODD. To operate the IEPS the following parameters need to be set.

Parameter	Description
Setpoint	The target pressure for the process, in units of pressure.
Tolerance	The pressure range about the setpoint that is acceptable (acceptable pressure = setpoint \pm tolerance), in units of pressure.
Hysteresis	The degree by which the acceptable pressure range is reduced after the pressure has exceeded the setpoint \pm tolerance range. The IEPS will not consider the pressure to have returned to an acceptable level until it is within: setpoint \pm (tolerance – hysteresis). This prevents the output / display oscillating between acceptable / unacceptable when the pressure is near a boundary value. In units of pressure.
Pressure Units	The units of pressure measurement: bar, psi or MPa.
Temperature Units	The units of temperature: °C or °F. (Does not affect temperature communicated as a process variable, which is always in °C).
Digital Output Type	Sets the digital output to NPN, PNP or PP (push-pull). Push-pull outputs can drive either NPN or PNP inputs but cannot be combined with other signals.
Digital Output Normal	Normally high (HIGH) or normally low (LOW). Indicates the state of the digital output when pressure is in the acceptable range. High impedance (hi-Z). In high impedance state the pin does not drive any signal and may be connected to active pins if necessary.





IO-Link operation

IODD

To configure the Excelon Plus IEPS using IO-Link, it is strongly recommended that the IO-Link Device Descriptor (IODD) file is used. This should be loaded into the IO-Link master and / or configuration software according to the master selected. The master and its associated software will make the process data and parameters available.



The IODD can be obtained from: <u>https://www.norgren.com/uk/en/technical-support/software</u>

Process data

Process data and status is continually available, being cyclically transmitted from the device to the IO-Link master. In addition to pressure, the Excelon Plus IEPS also transmits its current operating temperature and supply voltage. These can be used as diagnostic markers.

Name	Туре	Description	Units
Process Pressure	32-bit floating-point value	The pressure monitored by the device.	bar
Device Operating Temperature	32-bit floating-point value	The temperature seen by the sensor in the unit. This is typically higher than ambient because of power dissipation from the active electronics.	°C
Device Supply Voltage	32-bit floating-point value	The voltage of the power supply measured by the unit.	Volts



Pressure units:

When using the IODD and an engineering tool, values are scaled to match the selected units. If the IODD is not used, then pressure is transmitted in bar and temperature in °C.

Temperature units:

IO-Link can be used to set the temperature units to °C or °F, however the process variable is always transmitted in °C.



ĵ	Process data are accompanied by status flags that indicate whether the value is valid or invalid. Invalid process data indicate a fault in the device, or that some element of the device is operating out of specification:
	Do not rely on invalid process data for monitoring processes
	 IO-Link Events communicate important events, including warnings and faults. See page 36
	 The IO-Link diagnostic parameters can be used to help investigate issues. See page 30
	The display will indicate errors, warnings and faults

Operation without using the IODD

Some PLC / IO-Link master configurations may not be able to access the IODD. In this case it is necessary to develop software that can interpret the information provided by the device. The required details are provided in the following sections. Even when using the IODD, these sections provide descriptions of all the parameters, diagnostics and events that are provided on the device.

Process data format

In the absence of an IODD file, process data are encoded in 120 bytes.

Variable	Data type	Sub- index	Bit offset	Notes
Process pressure status	8-bit unsigned integer	1	112	0 = Unknown or sensor fault 1 = Normal 2 = Warning! Pressure above rated pressure
Process pressure	32-bit floating point	2	80	In bar
Device operating temperature status	8-bit unsigned integer	3	72	 0 = Unknown or sensor fault 1 = Normal 2 = Warning! Under- temperature 3 = Warning! Over-temperature
Device operating temperature	32-bit floating point	4	40	In °C
Device supply voltage status	8-bit unsigned integer	5	32	0 = Unknown 1 = Normal 2 = Warning! Under-voltage 3 = Warning! Over-voltage
Device supply voltage	32-bit floating point	6	0	In Volts





Device parameters

Device parameters are requested by the IO-Link master and exchanged acyclically. They are written to and read from the device. Parameters can be settings, identification data or diagnostic data. They can be accessed at the IO-Link index (decimal) indicated. Parameters indicated with an asterisk are included in the IODD and can be configured using the Norgren IO-Link Configuration Tool.

Data types used in the tables

StringT	Character string
UIntegerT	Unsigned integer
CMD	IO-Link command
Float32T	32-bit floating-point number
ArrayT	Array of octets

Access used in the tables

RO	Read only (parameter can be read but not changed)
WO	Write only (parameter can be written but reading does not return a meaningful value)
RW	Read and write (parameter can be changed and the value read)

IO-Link parameters: Identification parameters

Parameters that are used to identify the device.

Name	Index	Description	Access	Туре	Size	IODD				
Identification	Identification parameters									
Vendor Name	16	Vendor name corresponding with IO- Link Vendor ID.	RO	StringT	64 octets	*				
Vendor Text	17	Information about the vendor.	RO	StringT	64 octets	*				
Product Name	18	Product name.	RO	StringT	64 octets	*				
Product ID	19	Product type or variant identification of the device.	RO	StringT	64 octets	*				
Product Text	20	Product information for the device.	RO	StringT	64 octets	*				



Serial Number	21	Serial number for each device.	RO	StringT	16 octets	*
Hardware Revision	22	Hardware revision code of the device.	RO	StringT	64 octets	*
Firmware Revision	23	Firmware revision code of the device.	RO	StringT	64 octets	*

IO-Link parameters: Parameter menu

Parameters that are used to configure the device.

Name	Index	Description	Access	Туре	Size	IODD
Factory Reset	2	Command = 0x82. Factory reset of device parameters.	WO	CMD	1 octet	*
Device Reset	2	Command = 0x80. Hardware reset of IEPS.	WO	CMD	1 octet	*
Reset Warnings	2	Command = 0xC6. Resets Warnings.	WO	CMD	1 octet	*
Extended ide	ntificatio	on				
Machine Tag	65	Optional 8-character (max) user identification displayed on device screen.	RW	StringT	8 octets	*
Function Tag	125	Optional 32-character (max) user function information describing device role.	RW	StringT	32 octets	*
Location Tag	126	Optional 32-character (max) user location information describing device location.	RW	StringT	32 octets	*
Application Specific Tag	24	Optional 32-character (max) user application information for the device.	RW	StringT	32 octets	*
Message Tag	66	Optional 140-character (max) user message displayed on device screen.	RW	StringT	140 octets	*
Pressure sett	ings					
Units	500	Pressure units. IODD Enum indicates units. BAR=0, PSI=1, MPA=2	RW	UIntegerT	1 octet	*
Setpoint	501	IEPS constraint: maximum rated pressure > setpoint > tolerance.	RW	Float32T	4 octets	*
Tolerance	502	IEPS constraint: setpoint > tolerance > hysteresis.	RW	Float32T	4 octets	*
Hysteresis	503	IEPS constraint: tolerance > hysteresis > minimum rated pressure .	RW	Float32T	4 octets	*



Maximum Limit, No Hysteresis	504	Defines upper limit of process pressure. Process is outside specification when pressure is greater than this value.	RO	Float32T	4 octets	
Maximum Limit, with Hysteresis	505	When pressure is outside specification (above positive limit), process returns to specification when pressure is less than this value.	RO	Float32T	4 octets	
Minimum Limit, No Hysteresis	506	Defines lower limit of process pressure. Process is outside specification when pressure is less than this value.	RO	Float32T	4 octets	
Minimum Limit, with Hysteresis	507	When pressure is outside specification (below negative limit), process returns to specification when pressure is greater than this value.	RO	Float32T	4 octets	
Calibration						
Pressure Offset Correction	508	Constraint: -rated pressure < offset correction < rated pressure	RW	Float32T	4 octets	
Pressure Span Correction	509	Constraint: 0.00 < offset correction < 2.00	RW	Float32T	4 octets	
Pressure con	straints					
Proof Pressure	510	Absolute maximum pressure. Permanent damage will result above this pressure.	RO	Float32T	4 octets	
Rated Pressure	511	Setpoint cannot be set greater than this value. Maximum pressure for which the IEPS is rated. Constraint: proof pressure > rated pressure > Minimum Rated Pressure	RO	Float32T	4 octets	
Minimum Rated Pressure	512	Setpoint cannot be set less than this value. Minimum pressure for which the IEPS is rated. Constraint: Rated Pressure > Minimum Rated Pressure	RO	Float32T	4 octets	
Temperature	settings					
Units	515	CELSIUS=0 or FAHRENHEIT=1	RW	UIntegerT	1 octet	*
Digital output	:					
Output Type	516	Enum: NPN=0, PNP=1, PUSH- PULL=2.	RW	UIntegerT	1 octet	*
Normal State	517	Enum: NORMALLY LOW=0, NORMALLY HIGH=1, HIZ=2.	RW	UIntegerT	1 octet	*



Device locks									
Local User Interface Lock	12	Parameterization via user interface (HMI) is locked / unlocked. DEFAULT is FALSE. 4lsb indicate state. See IO-Link specification.	RW	UIntegerT	2 octets (bit field)	*			
Display									
Rotation	522	Orientation of screen and buttons: 0 or 180 degrees. Enum 0="0°" or 1="180°"	RW	UIntegerT	1 octet	*			
Brightness	524	Backlight 0 or 100 %	RW	UIntegerT	1 octet	*			
PIN									
PIN	523	HMI PIN	RW	UIntegerT	2 octets	*			

IO-Link parameters: Observation menu

These are parameters containing the operating variables.

Name	Index	Description	Access	Туре	Size	IODD
Operating Ho	urs					
Operating Minutes Since Power On	67	Operating time since power-on in minutes.	RO	UIntegerT	1 octet	*
Operating Hours Since Power On	68	Operating time since power-on in hours.	RO	UIntegerT	2 octets	*
Operating Minutes Totaliser	69	Operating time totaliser in minutes.	RO	UIntegerT	1 octet	*
Operating Hours Totaliser	70	Operating time totaliser in hours.	RO	UIntegerT	2 octets	*
Digital Output	:					
Digital Output	143	LOW=0, HIGH=1, HIZ=2	RO	UIntegerT	1 octet	*



IO-Link parameters: Diagnosis menu

These are parameters which support diagnosis of the device.

Name	Index	Description	Access	Туре	Size	IODD
Device IO-Lin	k Diagno	stics				
Device Status	36	See IO-Link spec B.2.18	RO	UIntegerT	1 octet	*
Detailed Device Status [1] Detailed Device Status [2] : Detailed Device Status [20]	37	List of pending Events in the Device. Event codes and qualifiers of 'Error' and 'Warning' events of Mode 'Appear', are entered onto the Detailed Device array. The entry is cleared upon occurrence of mode "Event disappears". In this way, the Detailed Device Status provides the current diagnosis of the Device. See B.2.19. Table B.14 in the IO- Link specification Each event object is 3 octets. Octet 1: Event Qualifier Octets 2 & 3: Event Code.	RO	ArrayT	64 octets (21 Events)	*
Error Count	32	Errors that occurred in the Device since power-on or reset.	RO	UIntegerT	2 octets	*
Supply Voltag	ge Diagno	ostics				
Voltage Sensor Status	80	Sensor status. UNKNOWN=0 RUNNING=1 CONNECTION FAULT=2 DATA FAULT=3 UNKNOWN FAULT=4	RO	UIntegerT	1 octet	
Voltage Status	95	Voltage status. UNKNOWN=0 NORMAL=1 UNDERVOLTAGE=2 OVERVOLTAGE=3	RO	UIntegerT	1 octet	*
Voltage Data	81	ADC Data. In bits.	RO	UIntegerT	2 octets	
Voltage Value	82	Device supply voltage (IO-Link L+). In Volts	RO	Float32T	4 octets	
Minimum Voltage Limit	83	Minimum voltage, less than this is an under-voltage. In Volts	RO	Float32T	4 octets	
Maximum Voltage Limit	84	Maximum voltage, greater than this is an over-voltage. In Volts	RO	Float32T	4 octets	



Minimum Measured Voltage	85	Lowest supply voltage measured by Device. In Volts	RO	Float32T	4 octets	
Under- Voltage Total	86	Total number of under-voltage warning events.	RO	UIntegerT	2 octets	
Under- Voltage Count	87	Number of under-voltage warning events since last reset.	RO	UIntegerT	2 octets	
Maximum Measured Voltage	88	Highest supply voltage measured by Device.	RO	Float32T	4 octets	
Over-Voltage Total	89	Total number of over-voltage warning events.	RO	UIntegerT	2 octets	
Over-Voltage Count	90	Number of over-voltage warning events since last reset.	RO	UIntegerT	2 octets	
Sensor Connection Fault Total	91	Total number of voltage sensor connection fault events.	RO	UIntegerT	2 octets	
Sensor Connection Fault Count	92	Total number of connection fault events since last reset.	RO	UIntegerT	2 octets	
Sensor Data Fault Total	93	Total number of voltage sensor data fault events.	RO	UIntegerT	2 octets	
Sensor Data Fault Count	94	Total number of data fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counters	2	CMD=164. Reset under-voltage and over-voltage event counter.	WO	CMD	1 octet	
Reset Voltage	2	CMD=165. Resets min and max measured supply voltage to current voltage.	WO	CMD	1 octet	
Operating Ter	nperatur	e Diagnostics		1		
Temperature Sensor Status	100	Current status. UNKNOWN=0 RUNNING=1 CONNECTION FAULT=2 DATA FAULT=3	RO	UIntegerT	1 octet	
Temperature Status	115	Current status. UNKNOWN=0 NORMAL=1 UNDER-TEMPERATURE=2 OVER-TEMPERATURE=3	RO	UIntegerT	1 octet	*
Temperature Data	101	Sensor raw data (16-bit). In bits	RO	UIntegerT	2 octets	



Temperature Value	102	Device operating temperature measured by pressure sensor. °C or °F as per configuration	RO	Float32T	4 octets	
Minimum Temperature Limit	103	Minimum temperature, less than this is an under-temperature. °C or °F as per configuration	RO	Float32T	4 octets	
Maximum Temperature Limit	104	Maximum temperature, greater than this is an over-temperature. °C or °F as per configuration	RO	Float32T	4 octets	
Minimum Measured Temperature	105	Lowest operating temperature measured by Device. °C or °F as per configuration	RO	Float32T	4 octets	
Under- Temperature Total	106	Total number of under- temperature warning events.	RO	UIntegerT	2 octets	
Under- Temperature Count	107	Number of under- temperature warning events since last reset.	RO	UIntegerT	2 octets	
Maximum Measured Temperature	108	Highest operating temperature measured by Device. °C or °F as per configuration	RO	Float32T	4 octets	
Over- Temperature Total	109	Total number of over- temperature warning events.	RO	UIntegerT	2 octets	
Over- Temperature Count	110	Number of over- temperature warning events since last reset.	RO	UIntegerT	2 octets	
Sensor Connection Fault Total	111	Total number of temperature sensor connection fault events.	RO	UIntegerT	2 octets	
Sensor Connection Fault Count	112	Total number of connection fault events since last reset.	RO	UIntegerT	2 octets	
Sensor Data Fault Total	113	Total number of temperature sensor data fault events.	RO	UIntegerT	2 octets	
Sensor Data Fault Count	114	Total number of data fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counters	2	CMD=166. Reset under- temperature and over-temperature event counters.	WO	CMD	1 octet	
Reset Temperature	2	CMD=167. Resets min and max operating temperature to current operating temp.	WO	CMD	1 octet	



Memory Diag	nostics					
Memory Status	120	A NVM memory device fault was detected. UNKNOWN=0 NORMAL=1 CONNECTION FAULT=2 MEMORY LOSS=3		1 octet	*	
Memory Fault Total	121	Total number of memory device faults.	RO	UIntegerT	2 octets	
Memory Fault Count	122	Number of memory device faults since last reset.	RO	UIntegerT	2 octets	
Memory Loss Total	123	Total number of memory losses.	RO	UIntegerT	2 octets	
Memory Loss Count	124	Number of memory losses since last reset.	RO	UIntegerT	2 octets	
Reset Counters	2	CMD=168. Reset memory fault and loss count.	WO	CMD	1 octet	
IO-Link PHY D	Diagnosti	CS				
PHY Status	130	An IO-Link connection fault was detected. IO-Link phy fault pin was asserted indicating over-current, over-temperature, or under-voltage event. UNKNOWN=0 NORMAL=1 CONNECTION FAULT=2 UNKNOWN FAULT=3	RO	UIntegerT	1 octet	*
PHY Fault Total	131	Total number of IO-Link connection fault events.	RO	UIntegerT	2 octets	
PHY Fault Count	132	Number of IO-Link connection fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counter	2	CMD=169. Reset IO-Link connection fault counter.	WO	CMD	1 octet	
Digital Output	Digital Output PHY Diagnostics					
PHY Status	140	An DIO connection fault was detected. DIO phy fault pin was asserted indicating over-current, over-temperature, or under-voltage event. UNKNOWN=0 NORMAL=1 CONNECTION FAULT=2 UNKNOWN FAULT=3	RO	UIntegerT	1 octet	*



PHY Fault Total	141	Total number of DIO connection fault events.	RO	UIntegerT	2 octets	
PHY Fault Count	142	Number of DIO connection fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counter	2	CMD=170. Reset DIO connection fault counter.	WO	CMD	1 octet	
Pressure Sen	sor Diagi	nostics				
Sensor Status	160	Current process sensor status. UNKNOWN=0 NORMAL=1 CONNECTION FAULT=2 DATA FAULT=3	RO	UIntegerT	1 octet	*
Pressure Data	161	Sensor raw data (16-bit). In bits.	RO	UIntegerT	2 octets	
Pressure Value	162	Pressure measured by pressure sensor. In BAR, PSI or MPA as per configuration	RO	Float32T	4 octets	
Sensor Connection Fault Total	165	Total number of IO fault events (a bus fault or 3 consecutive samples 0x00).	RO	UIntegerT	2 octets	
Sensor Connection Fault Count	166	Number of IO fault events since last reset.	RO	UIntegerT	2 octets	
Sensor Data Fault Total	167	Total number of data fault events (3 consecutive raw data samples out of range).	RO	UIntegerT	2 octets	
Sensor Data Fault Count	168	Number of data fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counters	2	CMD=174. Reset io, and data fault counts to zero.	WO	CMD	1 octet	
Pressure Diag	gnostics					
Pressure Status	170	Current pressure status. UNKNOWN=0 NORMAL=1 RATED WARNING=2	RO	UIntegerT	1 octet	
Maximum Measured Pressure	171	Highest operating pressure measured by Device since last reset. In BAR, PSI or MPA as per configuration.	RO	Float32T	4 octets	
Rated Pressure Warning Total	172	Total number of rated pressure warning events.	RO	UIntegerT	2 octets	



Rated Pressure Warning Count	173	Number of rated pressure warning events since last reset.	RO	UIntegerT	2 octets	
Reset Counts	2	CMD=175. Reset rated warning and proof pressure fault counts to zero.	WO	CMD	1 octet	
Reset Maximum Pressure	2	CMD=176. Reset maximum operating pressure to current operating pressure.	WO	CMD	1 octet	
Display Diagn	ostics					
Display Status	180	Current display status based on 10-second periodic heartbeat. A connection fault has occurred if the display driver IC vendor ID is not correctly read. UNKNOWN=0 NORMAL=1 CONNECTION FAULT=2 UNKNOWN FAULT=3	RO	UIntegerT	1 octet	*
Display Actual Vendor ID	181	Display driver IC vendor ID as read from the display.	RO	UIntegerT	1 octet	
Display Expected Vendor ID	184	Display driver IC vendor ID as per datasheet.	RO	UIntegerT	1 octet	
Display Connection Fault Total	182	Total number of display connection fault events.	RO	UIntegerT	2 octets	
Display Connection Fault Count	183	Number of display connection fault events since last reset.	RO	UIntegerT	2 octets	
Reset Counts	2	CMD=163. Reset display connection fault count to zero.	WO	CMD	1 octet	



IO-Link Events

Events are operating messages or error/fault warnings that need to be brought to the attention of the control system. Device events are immediately transmitted to the IO-Link Master which then makes the information available to the controller.

IO-Link events: summary of operating events

IODD Name ¹	IODD Description	General Description	Event Code	Туре	Device Status
		Event Appear: Measured Pressure > Upper Limit			
		OR	6161 (0x1811)	Warning	
	Process pressure is outside tolerance.	Measured Pressure < Lower Limit			0 (Device is operating properly)
PRESSURE MESSAGE		Event Disappear: Measured Pressure < Upper Limit with Hysteresis			
		AND			
		Measured Pressure > Lower Limit with Hysteresis			
			0.100		0
PIN MESSAGE	Access attempted using an incorrect PIN.	Incorrect PIN message	6162 (0x1812)	Message	(Device is operating properly)
			STANDARD		0
-	Parameter changed – check configuration.	A parameter was changed.	25424 (0x6350)	Message	(Device is operating properly)
[1] The engineering tool may display the event name and description which are contained in the IODD file.					



IO-Link events: summary of warning and fault events

IODD Name ¹	IODD Description	General Description	Event Code	Туре	Device Status
-	Component malfunction – repair or exchange.	A general fault was detected.	STANDARD20496 (0x5010)	Error	4 (Failure)
-	Primary supply voltage over-run – check tolerance.	A supply over-voltage occurs when the supply is greater than 24VDC + 25% Event Appear: Voltage > 30VDC Event Disappear: Voltage < 28VDC	STANDARD20752 (0x5110)	Warning	2 (Out-of- Specification)
-	Primary supply voltage under-run – check tolerance.	A supply under-voltage occurs when the supply is less than 24VDC - 25% Event Appear: Voltage < 18VDC Event Disappear: Voltage > 20VDC	STANDARD20753 (0x5111)	Warning	2 (Out-of- Specification)
-	Device temperature over- run – clear source of heat.	An over-temperature occurs when the operating temperature is greater than. Event Appear: Temperature > prated temperature (+75 °C / 185 °F). Event Disappear: Temperature < phrated temperature (+70 °C / 176 °F).	STANDARD16912 (0x4210)	Warning	2 (Out-of- Specification)
-	Device temperature under-run – insulate device.	An under-temperature occurs when the operating temperature is less than -20 Event Appear: Temperature < nrated temperature (-20 °C / -4°F). Event Disappear: Temperature > nhrated temperature (-15 °C / -5°F).	STANDARD16928 (0x4220)	Warning	2 (Out-of- Specification)
-	Non-volatile memory loss.	IO-Link data stored in EEPROM is corrupted, so cannot be used. Data is stored in two EEPROM locations. Data integrity is checked using a CRC checksum. A memory loss	STANDARD 20497 (0x5011) & STANDARD25424	Error	4 (Failure)



		event occurs when both locations fail CRC validation. Event Appear: Yes Event Disappear: none	(0x6350)		
-	Process variable range over-run – process data uncertain.	⁵ Process pressure is greater than IEPS rated pressure. Rate pressure is the maximum pressure for which sensor performance is specified. The sensor total error band is not guaranteed for pressures greater than the rate pressure but less than the proof pressure, but there is no permanent damage. Event Appear: rated pressure (10 bar / 145 psi / 1 MPa) < measured pressure < proof pressure Event Disappear: measured pressure < rated pressure hysteresis (9 bar / 130.5 psi / 0.9 MPa)	STANDARD35856 (0x8C10)	Warning	2 (Out-of- Specification)
PRESSURE SENSOR FAULT	FAULT! A pressure sensor fault was detected. Power- cycle device. Contact engineering if problem persists.	A pressure sensor fault was detected: io fault, sensor I2C communication retried out; or data fault. Event Appear: sensor fault Event Disappear: sensor fault	USER 6144 (0x1800)	Error	4 (Failure)
MEMORY FAULT	FAULT! A memory hardware fault was detected. IO- Link data cannot be read or stored in memory. Device parameters have reverted to factory settings. Power-cycle device. Contact engineering if problem persists.	A memory hardware fault was detected. EEPROM I2C retried out. Event Appear: EEPROM fault Event Disappear: EEPROM fault	USER 6145 (0x1801) & STANDARD25424 (0x6350)	Error	4 (Failure)
DISPLAY FAULT	FAULT! A display fault was detected. Power- cycle device. Contact support if	A display connection fault was detected. IEPS failed to read vendor ID from display driver PHY. Event Appear : display fault	USER 6146 (1802)	Error	4 (Failure)



	problem persists.	Event Disappear: display fault			
NFC TAG FAULT	FAULT! An NFC Tag fault was detected. NFC cannot be used. Power-cycle device. Contact engineering if problem persists.	An NFC connection fault was detected. Event Appear: NFC fault Event Disappear: NFC fault	USER 6147 (0x1803)	Error	4 (Failure)
DIO CONNECTION FAULT	FAULT! A Digital Output connection fault was detected. Check connection and power-cycle device. Contact engineering if problem persists.	A DIO connection fault was detected. DIO phy asserted fault signal caused by either over-current, over- temperature, or under- voltage. Event Appear: phy nfault Event Disappear: phy nfault	USER 6148 (0x1804)	Error	4 (Failure)
VOLTAGE SENSOR FAULT	FAULT! A voltage sensor fault was detected. Power- cycle device. Contact engineering if problem persists.	A voltage sensor fault was detected. Event Appear: sensor fault Event Disappear: sensor fault	USER 6150 (0x1806)	Error	4 (Failure)
TEMPERATURE SENSOR FAULT	FAULT! A temperature sensor fault was detected. Power- cycle device. Contact engineering if problem persists.	A temperature sensor fault was detected. Event Appear: sensor fault Event Disappear: sensor fault	USER 6151 (0x1807)	Error	4 (Failure)
[1] The enginee	ering tool may displa	ay the event name and description	on which are containe	ed in the IO	DD file.



EU – Declaration of conformity

1. Product

Excelon Plus Integrated Electronic Pressure Sensor.

2. Manufacturer

Norgren Ltd

Blenheim Way, Fradley Park,

Lichfield. Staffordshire.

WS13 8SY

UK

3. We declare that this declaration of conformity is issued under the sole responsibility of the above manufacturer

4. Object of the declaration

Part numbers of the form: R84G-***-R*E; B84G-***-R*E; B84G-***-R*E; B84G-***-R*E-BS; Q84G-**N-NNE

Where * represents a letter or digit.

- 5. The object of the declaration described above is in conformity with the relevant Union harmonisation legislation(s)
- Directive 2014/30/EU (The EMC Directive)
- Directive 2011/65/EU as amended by 2015/863 and 2017/2102 (The RoHS directive)
- 6. The following harmonised standards and technical specifications have been applied
- EN 61000-6-2:2019
- EN 61000-6-3:2007+A1:2011
- EN 50581:2012
- 7. Additional information

N/A

8. Signatures

Signed for and on behalf of	Norgren Ltd
Date of issue	November 2020
Place of issue	Blenheim Way, Fradley Park, Staffordshire, UK
Name (block capitals)	JAMES ROBINSON
Position	Technical Director
Signature	12



Not for use where an explosive atmosphere may be present



DANGER! Not to be used where an explosive atmosphere may be present!

- This unit does **NOT** have ATEX approval.
- Do **NOT** use in areas where an explosive atmosphere may be present.



Recycling information

Device composition

Covers	ABS
Overlay	Polyester
PCB	Various, dispose of according to WEEE

Removing the circuit board





Waste electrical and electronic equipment



Disposal of this product is regulated by the EU WEEE Directive for waste electrical and electronic equipment. Dispose of the product properly and not as part of the normal waste stream. Observe the regulations of the respective country: information can be obtained from the national authorities.



Accessories

See the Norgren webstore: <u>www.norgren.com</u>

See the datasheet.

Q84G - ???

- B84G http://cdn.norgren.com/pdf/en_8_200_350_B84G.pdf // Data Sheet: 8_200_350_B84G
- R84G http://cdn.norgren.com/pdf/en_8_200_250_R84G.pdf // Data Sheet: 8_200_250_R84G



Online support

Norgren Ltd	https://www.norgren.com/
Norgren configurator	https://www.imi-precision.com/uk/en/technical-support/configurators/air-preparation
Datasheets	Q84G - ???
	B84G - <u>http://cdn.norgren.com/pdf/en_8_200_350_B84G.pdf</u> Data Sheet: 8_200_350_B84G
	R84G - <u>http://cdn.norgren.com/pdf/en_8_200_250_R84G.pdf</u> Data Sheet: 8_200_250_R84G
IODD file	https://www.norgren.com/uk/en/technical-support/software
I&M sheet (Quick start guide)	I&M Sheet: <u>http://cdn.norgren.com/pdf/IM_Excelon_Plus_EN_final.pdf</u> Quick Start Guide: ???
Excelon Plus I&M sheet	http://cdn.norgren.com/pdf/IM_Excelon_Plus_EN_final.pdf



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The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of exercising judgement and verification. It must be remembered that our products are subject to a natural process of wear and ageing.

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Printed in England. These instructions were originally written in English.