FX Analog Family
FX3u Analog Platform – A new benchmark in Analog control

With the arrival of the new FX3u comes a new range of analog products that have been designed to enhance user functionality, system performance and ease of set-up. These new products surpass previous analog solutions and create a new benchmark for analog control in a cost effective manner.

In order to respond to the most diverse of analog problems, two product ranges have been developed. The FX3u Special Adapters deliver advanced solutions in an easy to use manner, saving the user from the frustration of complex setup routines. Whereas the FX3u Special Function Blocks provide an ideal answer to the toughest of high speed problems combining high accuracy with high speed.

The FX3u analog range delivers a straightforward concept that delivers advanced solutions in a simple and easy to use package.

What is Analog Control?
Analog control is used in a broad range of industries. In simple terms, it enables a discrete signal to provide control within a PLC system. Basic examples of analog control include collection of sensory data from fluid levels and control of a motor’s speed. Systems can be developed and configured to each user’s needs and requirements.

Digital to Analog Control
A process where the PLC system converts digital signals to analog (voltage/current) signals. For example linear control for an inverter.

Analog to Digital Control
Where analog signals are captured from the outside world and are converted to a digital format so that PLC system control can be implemented.

Temperature Input and PID Control
Temperature data can be acquired via two sensory methods – thermocouple input or PT100 sensor input.

PID control enhances system performance as it eliminates the need for continuous operator intervention. Through use of Auto-Tuning, important parameters are automatically configured to the PID function, ensuring that optimum control is achieved for a range of temperature and analog control applications.
- Straightforward setup
- Cost effective
- Easy to use programming instructions
- Extremely versatile

**FX3u Special Adapters**

A major design enhancement to the FX3u is the new Special Adapters. Special Adapters implement control through direct access data registers and setting bits. This means quicker set-up, easier use, and above all much higher processing speeds.

**FX3u at a glance**

- I/O range: Max. total 384 (with remote I/O)
- Program memory: 64k steps (standard)
- Processing speed: 0.065μsec/basic instruction

**FX3u Special Function Blocks**

- New high speed programming instructions
- Combines high Speed with accuracy
- Integral CPUs enable independent operation from the PLC
- Perfect for high speed applications

**Special Adapters**

- Special Adapters connect to the left side of the FX3u series PLC.
- An expansion board is required in the system to connect the special adapters.
- A combination of up to 4 analog / temperature Special Adapters can be connected to one FX3u PLC. (The FX3u can also support a further 2 network adapters and 4 positioning adapters).

**Special Function Blocks**

- Special Function Blocks connect to the right side of the FX3u Series PLC.
- Up to 8 Special function blocks can be connected to one FX3u PLC, where a combination of analog networking and positioning Special Function Blocks can be configured.*
- Full compatibility with FX2n and FX3n Special Function Blocks.

**FX3u System Configuration**

*Additional power unit may be required.*
Despite the growing presence of digital systems, the world continues to provide endless analog problems. Today’s product lineup has come to the foreground to tackle these problems head on.

With products that provide in-built features such as direct connection to sensors, advanced digital filtering to reduce noise or direct correlation of data for simple real-time control. The FX analog family continues to provide solutions for a diverse range of needs.

Visual Solutions

Mitsubishi Electric offers a comprehensive range of visual solutions. From simple data displays such as the FX3U-7DM, advanced Graphic Operator Terminals like the GOT1000 Series, along with a wide choice of software solutions from the MELSOFT software suite.

International acceptance

Compliance with CE and UL/cUL standards enables users worldwide to put faith into the FX brand. The FX range is also certified to a variety of shipping approvals that include Lloyd’s, German Lloyd’s, American Bureau of shipping, Registro Italiano Navale, DET Norse Veritas and Bureau Veritas.

GX Developer

GX Developer is the standard Windows based programming software for all MELSEC PLC series. Sequence programs for a range of applications are comfortably created in Ladder Logic or Instruction List. There are also several options available for monitoring, debugging and testing user code.

Simplified Programs with Special Adapters

The FX3U analog Special Adapters simplify program code by providing automatic transfer of data to and from the PLC. This has a major benefit for the user as Special Adapters no longer require the use of the traditional To/From instructions to configure and operate. This enables programming code to be dramatically simplified.
**FX3u Special Analog Adapters NEW**

The FX3u-4AD-ADP and the FX3u-4DA-ADP are equipped with 4 input / 4 output channels respectively. These analog adapters provide complete versatility, where each channel can be independently configured for either voltage or current control signals.

**FX3u Temperature Adapters NEW**

For temperature sensor input, the FX3u range provides two great solutions. The versatile FX3u-4AD-TC-ADP provides the user with 4 inputs that can be configured for either J or K type thermocouples. Alternatively, the user can opt for the FX3u-4AD-PT-ADP which features four PT100 sensors per adapter.

**FX2N-5A - Hybrid Converter**

The FX2N-5A delivers extremely high resolution combined with 4 independently configurable inputs and 1 output. Independent channel configuration enables the FX2N-5A to work harmoniously with the most diverse of analog devices.

**Functional Expansion Boards**

Through use of expansion boards analog control can easily be implemented via the FX1s and FX1N PLCs.

Expansion boards permit an additional 2 inputs or 1 output respectively to be integrated to the PLC.

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* For further product information see specifications table on next page or respective product manual.
### Specifications

#### DA

<table>
<thead>
<tr>
<th>Output Channel</th>
<th>FXn-1SA-BD</th>
<th>FXn-2DA</th>
<th>FXn-4DA</th>
<th>FXn-4DA</th>
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</thead>
<tbody>
<tr>
<td>Analog Output Range</td>
<td>0 to 10V DC (2k to 1MΩ)</td>
<td>4 to 20mA (500Ω or less)</td>
<td>0 to 5V DC, 0 to 10V DC (2k to 1MΩ)</td>
<td>4 to 20mA (400Ω or less)</td>
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<tr>
<td>Resolution</td>
<td>2.5mV</td>
<td>8μA</td>
<td>2.5mV</td>
<td>4μA</td>
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<tr>
<td>Digital Input</td>
<td>12 bit</td>
<td>12 bit</td>
<td>Signed 12 bit</td>
<td>10 bit</td>
</tr>
<tr>
<td>Overall Accuracy</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Conversion Time</td>
<td>one scan time</td>
<td>2.5ms / channel</td>
<td>Normal speed: 15ms / number of used channel</td>
<td>1ms / number of used channel</td>
</tr>
<tr>
<td>Isolation</td>
<td>None</td>
<td>See Notes below: *3 &amp; *4</td>
<td>None</td>
<td>See Notes below: *3 &amp; *4</td>
</tr>
<tr>
<td>No. of Occupied I/O</td>
<td>8 points</td>
<td>8 I/O points</td>
<td>8 I/O points</td>
<td>8 I/O points</td>
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<tr>
<td>Applicable PLC</td>
<td>FXn / FXn</td>
<td>FXn / FXn / FXn / FXn</td>
<td>FXn / FXn / FXn / FXn</td>
<td>FXnc</td>
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<td>Certifications *2</td>
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#### BD

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<tr>
<th>Input Channel</th>
<th>FXn-2AD-BD</th>
<th>FXn-2AD</th>
<th>FXn-4AD</th>
<th>FXn-4AD</th>
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<tbody>
<tr>
<td>Analog Input Range (Input resistance)</td>
<td>0 to 10VDC (300kΩ)</td>
<td>4 to 20mA (2500Ω)</td>
<td>0 to 5VDC, 0 to 10VDC (200kΩ)</td>
<td>4 to 20mA (2500Ω)</td>
</tr>
<tr>
<td>Resolution</td>
<td>2.5mV</td>
<td>8μA</td>
<td>2.5mV</td>
<td>4μA</td>
</tr>
<tr>
<td>Digital Output</td>
<td>12 bit</td>
<td>12 bit</td>
<td>Signed 12 bit</td>
<td>Signed 11 bit</td>
</tr>
<tr>
<td>Overall Accuracy</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
<td>±1%</td>
</tr>
<tr>
<td>Conversion Time</td>
<td>one scan time</td>
<td>2.5ms / 1 channel</td>
<td>Normal speed: 15ms / number of used channel</td>
<td>1ms / number of used channel</td>
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<tr>
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<td>See Notes below: *3 &amp; *4</td>
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<tr>
<td>Applicable PLC</td>
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<td>FXn / FXn / FXn / FXn</td>
<td>FXn / FXn / FXn / FXn</td>
<td>FXnc</td>
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#### Temperature

<table>
<thead>
<tr>
<th>Channel</th>
<th>FXn-2LC</th>
<th>FXn-4AD-TC</th>
<th>FXn-4AD-PT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input Types</td>
<td>Thermocouple type K, E, J, R, S, T, B, N, PLC II, WRT-26, U and L, 3-wire platinum resistance thermometer sensor(s): Pt100, and JPt100</td>
<td>Type K type thermocouple</td>
<td>3-wire platinum resistance thermometer sensor(s): Pt100</td>
</tr>
</tbody>
</table>
| Compensated range | Examples:  
- Type K: -100°C to +1300°C / -100°F to +2400°F  
- Type J: -100°C to +800°C / -100°F to +1800°F | -100°C to +1200°C / -180°C to +2192°F | K type thermocouple |
| Resolution | 0.1°C / 0.1°F or 1°C / 1°F | 0.4°C / 0.72°F | J type thermocouple |
| Digital Output | Examples:  
- Type K: -100°C to +1300°C / -100°F to +2400°F  
- Type J: -100°C to +800°C / -100°F to +1800°F | -1000 to +1200°C / -1800 to +2192°F | -100°C to +1200°C / -1800 to +2192°F |
| Accuracy | ±0.7% of range span ± 1digit *12 | ±0.5% of fullscale ±1°C | ±0.5% of fullscale ±1°C |
| Conversion Time | 500ms (Sampling time) | (240ms ±2%) / Number of used channel | 15ms / 1 channel |
| No. of Occupied Points | 8 points | 8 I/O points | 8 I/O points |
| Applicable PLC | FXn / FXn / FXnc / FXn | FXn / FXn / FXnc / FXn | FXn / FXn / FXnc / FXn |
| Notes | Control method: Two-position, PID with auto-tuning, Pt control | — | — |
| Certifications *2 | CE, UL/cUL | CE, UL/cUL | CE, UL/cUL |

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Notes: (For detailed information please refer to the respective product manuals).

*1: Percentage of full scale
*2: For Shipping approvals consult with respective manual
*3: A photocoupler is used to isolate the analog input or output area from the PLC.
*4: Channels are not isolated from each other.
*5: FXnc-CN 4IF required for FXnc
*6: A DC/DC converter is used to isolate the power supply from the analog input or output.
*7: Data updated every PLC scan time
*8: FXn-***BD required. (** represents ‘422’, ‘232’, ‘485’, ‘CNI’, or ‘USB’)
**Safety Warning**

To ensure proper use of the products listed in this catalog, please be sure to read the instruction manual prior to use.

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