

Modicon Momentum

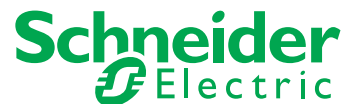
Fipio Communicator

Setup Manual

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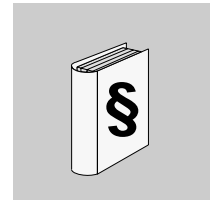
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Safety Information



Important Information

NOTICE

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result** in death or serious injury.

WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result** in death, serious injury, or equipment damage.

▲ CAUTION

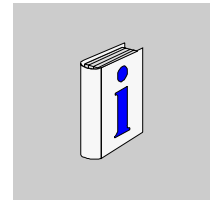
CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result** in injury or equipment damage.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

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About the Book



At a Glance

Document Scope

This manual describes setting up the Momentum communicator on Fipio.

Validity Note

The data and illustrations found in this book are not binding. We reserve the right to modify our products in line with our policy of continuous product development. The information in this document is subject to change without notice and should not be construed as a commitment by Schneider Electric.

Related Documents

| Title of Documentation | Reference Number |
|---------------------------------------------|------------------|
| Modicon Momentum I/O Base User Guide | 870 USE 002 |
| Modicon Momentum 170 AEC 920 00 User Manual | 870 USE 008 |

You can download these technical publications and other technical information from our website at www.schneider-electric.com.

Product Related Information

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All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When controllers are used for applications with technical safety requirements, please follow the relevant instructions.

Failure to use Schneider Electric software or approved software with our hardware products may result in improper operating results.

Failure to observe this product related warning can result in injury or equipment damage.

User Comments

We welcome your comments about this document. You can reach us by e-mail at techcomm@schneider-electric.com.

Momentum on Fipio - General



Aim of this Part

This part demonstrates the use of Momentum modules on the Fipio field bus.

What's in this Part?

This part contains the following chapters:

| Chapter | Chapter Name | Page |
|---------|------------------------------------|------|
| 1 | Fipio Bus and Momentum Modules | 11 |
| 2 | Introduction to Fipio Communicator | 15 |
| 3 | Installation | 17 |

Fipio Bus and Momentum Modules



Aim of this Chapter

This chapter demonstrates the use of Momentum modules on the Fipio field bus.

What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
|-------------------------------------------|------|
| Introduction to Fipio | 12 |
| Fipio Configuration with Momentum Modules | 13 |
| Review of Momentum Base Catalog | 14 |

Introduction to Fipio

Introduction

Fipio is the field bus for series 7 or series 1000 Premium PLCs. It allows the PLC inputs/outputs and closest industrial peripherals to be delocalized from the operative part.

On Fipio, the cyclic variables are used to update the status of the remote inputs/outputs for the PLC cycle rhythm.

Variables and aperiodic message handling are used for all functions concerning configuration, adjustment, diagnostics and operator dialog.

No specific knowledge is required to develop an application using the Fipio field bus. The designer simply declares in the software the devices connected to the bus, as with the input/output modules in the rack. The PL7 software automatically generates the network operating parameters, which are then loaded into the PLC. Interlinked screens guide the operator in configuration and adjustment functions for devices connected to the bus.

When routing or maintaining installation on the Premium PLCs, the programming terminals can be connected to any point on the Fipio bus. All the following software services are then available: programming, debugging, adjustment, etc. The terminals on the field bus are connected / disconnected without disturbing their operation.

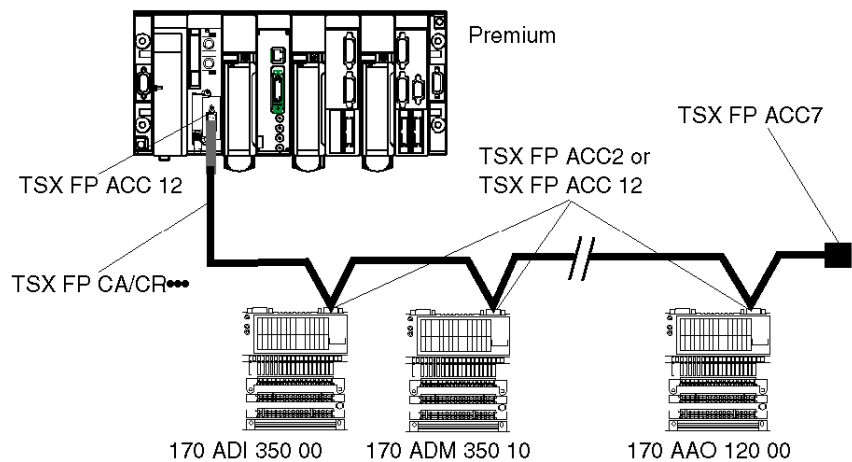
If the programming console to the overriding address point 63, it can use the software services of the PLC, which is controlling the Fipio bus and for all remote PLCs connected to the network, thanks to a transparency mechanism which is a feature of the X-Way communication structure.

Fipio Configuration with Momentum Modules

Connecting to Fipio Bus

The following accessories are used to connect the communicators:

- The **TSX FP ACC12** and **TSX FP ACC2** connectors for connecting the device to the Fipio bus.
- The **TSX FP CA/CR***** main cable (available in 3 lengths: 100m, 200m or 500m).
- The **TSX FP ACC14***** diversion cable (available in 3 lengths: 100m, 200m or 500m).
- The **TSX FP ACC14** and **TSX FP ACC4** diversion boxes.
- The **TSX FP ACC7** line end.
- The **TSX FP ACC12** connector for connecting to Premium PLCs.



Review of Momentum Base Catalog

General

There are two types of Momentum bases:

- standard bases, which are generally discrete
- advanced bases, which generally have at least one analog (ANA) or assimilated channel

Standard Momentum

Standard Momentum (*see page 38*) base references:

| Discrete Input Bases | Discrete Output Bases | Discrete Input/Output Modules | Profile |
|----------------------|-----------------------|-------------------------------|-------------|
| 170 ADI 340 00 | 170 ADO 340 00 | 170 ADM 350 10 | Other FRD |
| 170 ADI 350 00 | 170 ADO 350 00 | 170 ADM 350 11 | Other FRD_P |
| 170 ADI 540 50 | 170 ADO 530 50 | 170 ADM 350 15 | |
| 170 ADI 740 50 | 170 ADO 540 50 | 170 ADM 370 10 | |
| | 170 ADO 730 50 | 170 ADM 390 10 | |
| | 170 ADO 740 50 | 170 ADM 390 30 | |
| | 170 ADO 830 30 | 170 ADM 690 50 | |
| | | 170 ADM 690 51 | |
| | | 170 ADM 850 10 | |
| | | 170 ARM 370 30 | |

Advanced Momentum

Advanced Momentum (*see page 61*) base references:

| Analog Input Bases | Analog Output Bases | Discrete and Analog Inut/ Output Modules | Special Bases | Profile |
|--------------------|---------------------|------------------------------------------|----------------|-------------|
| 170 AAI 030 00 | 170 AAO 120 00 | 170 ANR 120 90 | 170 AEC 920 00 | Other FSD |
| 170 AAI 520 40 | 170 AAO 921 00 | 170 ANR 120 91 | | Other FSD_P |
| 170 AAI 140 00 | | 170 AMM 090 00 | | Other FED |
| | | | | Other FED_P |

Introduction to Fipio Communicator



2

General Information

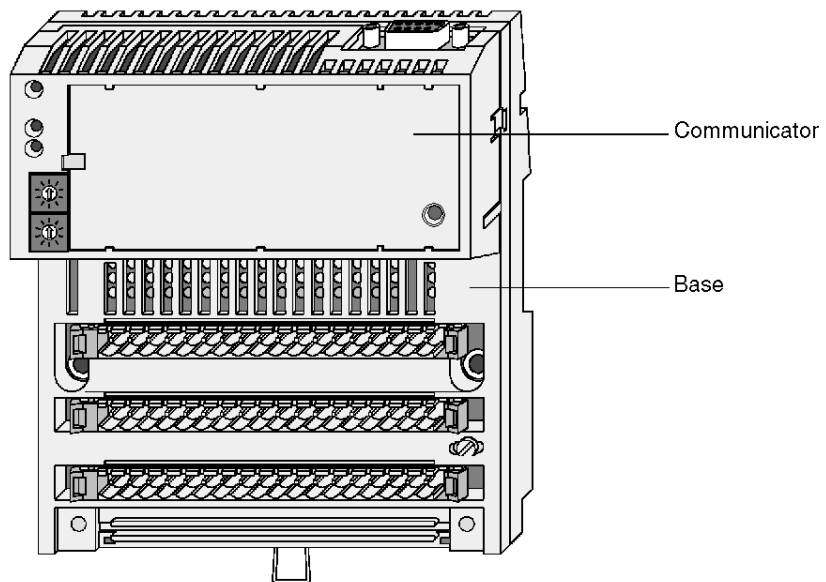
General

The **170 FNT 110 01** Fipio communicator establishes the interface between the Fipio bus, controlled by a Premium PLC and an input/output base from the Momentum product range.

The communicator is compatible with all Momentum catalog connection bases. It can only be used when connected to a base.

Illustration

The figure below shows a Fipio communicator mounted on a Momentum base.



NOTE: The communicator's power is supplied by the base to which it is connected.

Installation

3

Aim of this Chapter

This chapter deals with the installation of the Fipio communicator for Momentum modules.

What's in this Chapter?

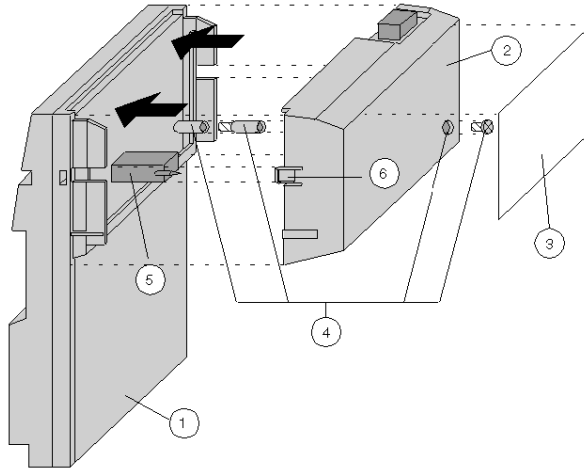
This chapter contains the following topics:

| Topic | Page |
|---------------------------------|------|
| Mounting the Fipio Communicator | 18 |
| Connecting to the Fipio Bus | 20 |

Mounting the Fipio Communicator

Mounting

To mount the communicator on a Momentum base, please refer to the illustration below.



- 1 I/O base
- 2 communication or processor adapter
- 3 fill-in label
- 4 PE/FE connection (only for special bases)
- 5 ATI link connector
- 6 snap-on clip

Dismounting

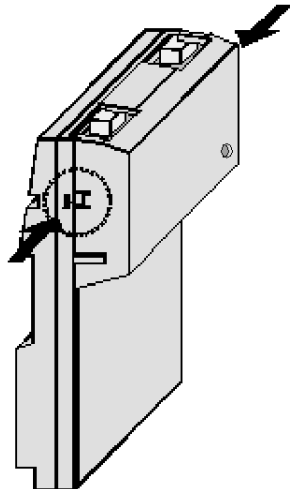
⚠ WARNING

POTENTIAL MODULE DAMAGE

- Use suitable anti-static measures when manipulating the module and avoid all contact with the internal elements.
The electrical components in the module are sensitive to static electricity.
- Ensure that the I/O base is inoperative when it does not have a module. To ensure that the base is inoperative, do not insert the coupling connectors into the I/O base after mounting the module.
I/O base electric circuits risk being exposed when a Momentum module is not mounted.
- Never power up the I/O base if it does not have a module. Ensure that the power is always off when the I/O base is not completely assembled.
When the unit is powered, the base is also powered.
- To ensure that the base is inoperative, do not insert the coupling connectors into the I/O base after mounting the module. When withdrawing a module from a base, disconnect the limit connectors beforehand.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

To dismount the communicator, remove the plug using a screwdriver, as indicated in the illustration below and move the communicator upwards.



Connecting to the Fipio Bus

Accessories

The following accessories are used to connect the communicators:

- The **TSX FP ACC12** and **TSX FP ACC2** connectors for connecting the device to the Fipio bus.

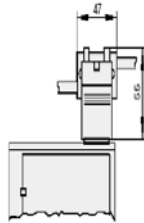
The TSX ACC2 connector has the advantage of being compact in relation to the TSX ACC12 connector, as shown in the following illustrations.

Connections

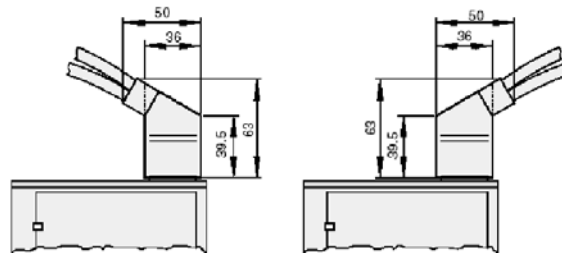
For further information on connecting and implementing a Fipio bus, please refer to the Fipio bus reference manual: **TSX DR FIP**.

The Fipio bus connections use the **TSX FP ACC12** or **TSX FP ACC2** connectors, as shown below.

Connection using the TSX FP ACC2 connector:



Connection using the TSX FP ACC12 connector:

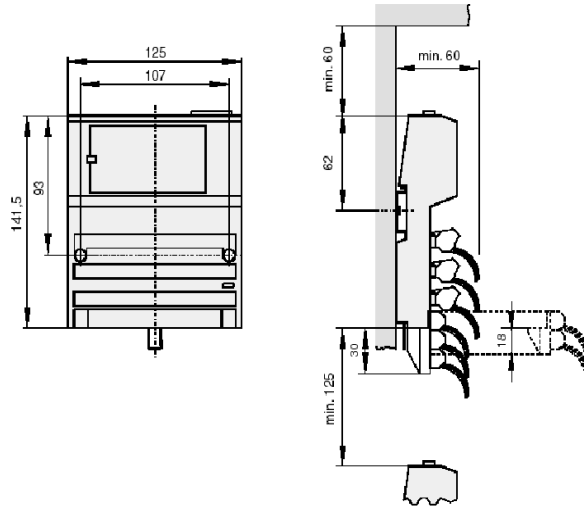


NOTE: It is necessary to ensure that for each hardware island, the garland of connectors is connected to at least one protective earth point.

Dimensions

The figure below shows the dimensions of a standard base connected to the Fipio bus. The minimum distances should be respected to allow a good air circulation.

When using the **TSX FP ACC12** connector, the free space below the base should be 150mm and not 60mm to allow the cables to pass.



Operating/Diagnostics



Description of the 170 FNT 110 01 Communicator

4

Aim of this Chapter

This chapter deals with the physical description of the **170 FNT 110 01** Fipio communicator module for Momentum.

What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
|------------------------------------|------|
| General Outlay of the Communicator | 26 |
| Communicator Addressing | 27 |
| Description of the Indicator LEDs | 28 |
| Visual Diagnostics | 29 |

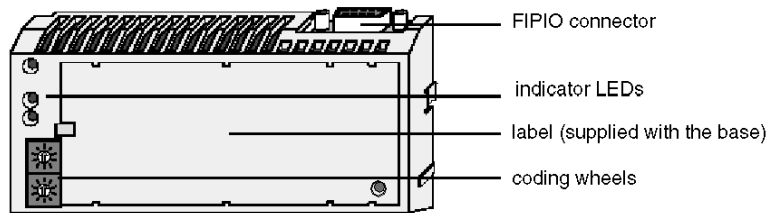
General Outlay of the Communicator

General

The **170 FNT 110 01** Fipio communicator serves as an interface between the Momentum I/O and the Fipio bus. The communicator is fixed on an input/output base (*see page 18*).

Description

The following figure provides the description of the communicator's different functions.



Communicator Addressing

General

A device on the Fipio bus is identified by its connection point.

The connection point number represents its physical address on the Fipio bus and can take a value between 1 and 99.

On Fipio, the address 0 is reserved for the bus's PLC manager. The address 63 is reserved for the programming terminal.

Coding

The device address is coded using two mini coding wheels located on the communicator (see *Description, page 26*). The address is decimal coded.



Modifications to the address are only accepted after switching the device off and back on.

NOTE: If the address is modified when the device is switched on, this causes an internal fault and the device disconnects from the Fipio bus.

Two devices on the Fipio bus should never have the same address. The simultaneous continued flashing of the 3 LEDs (RUN, ERR, COM) indicates that the device cannot be connected to the bus, as its address is already occupied by another device.

Description of the Indicator LEDs

General

The **170 FNT 110 01** communicator is equipped with three indicator LEDs (RUN, ERR, COM), which indicate the module status.

Meaning of LEDs

The table below lists the meaning of the communicator LEDs:

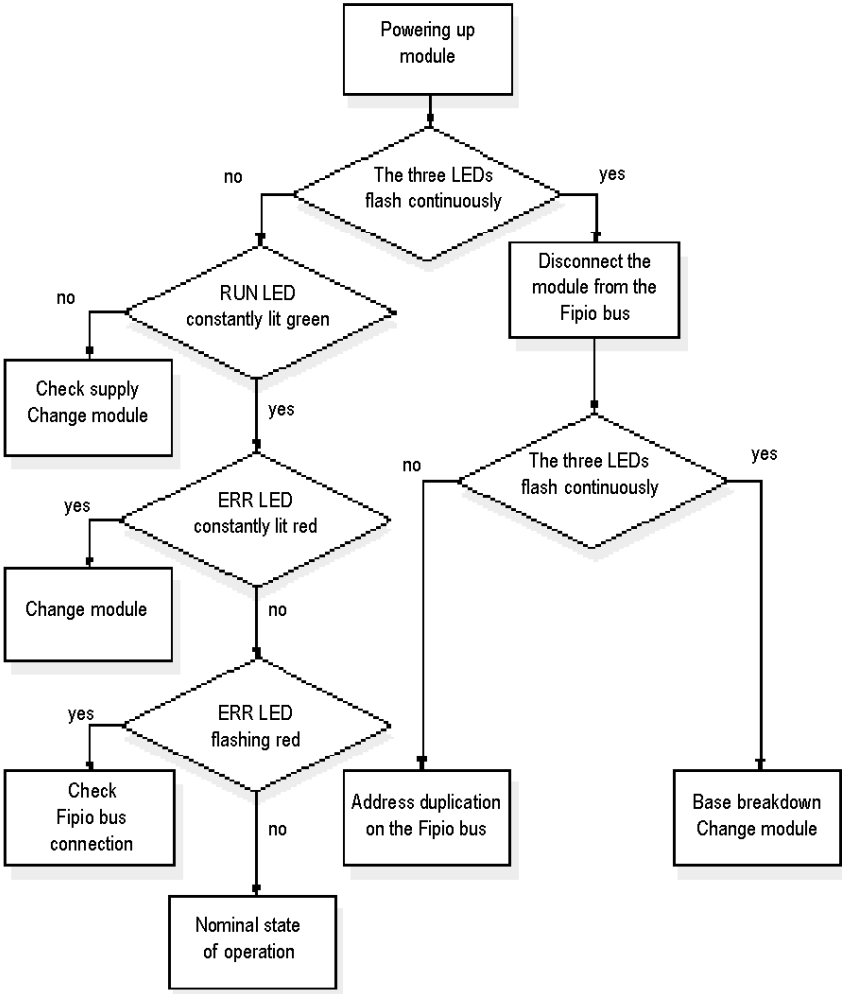
| Label | Color | Meaning |
|------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| RUN | Green | Switched on: Off: Device inoperative or totally inoperative. Flashing: Another device with the same address exists. |
| COM | Yellow | Communication activity: Off: Inactivity on the bus or communication stop. Flashing: <ul style="list-style-type: none">• During the device connection, self-test, initialization phases.• When the device is part of the bus exchanges. |
| ERR | Red | Major fault: Off: Device in normal operation. Flashing: During the device connection, self-test and initialization phases and when the device is not logically connected to the network. On: Fault requiring replacement of the device or one of its modules (sub-set breakdown, assembly of incompatible modules, etc.). |

NOTE: Depending on the type of base used, minor faults can be indicated on the base itself. Please refer to the Momentum base documentation (**870 USE 002**) to understand the meaning of the LEDs.

Visual Diagnostics

Diagnostics Help

Procedure to follow according to the status of the communicator's indicator LED:



Software Implementation



Aim of this Part

This part provides necessary information for the implementation and diagnostics of Momentum modules on a Fipio bus via the PL7 software.

What's in this Part?

This part contains the following chapters:

| Chapter | Chapter Name | Page |
|---------|----------------------------------|------|
| 5 | Addressing Momentum Modules | 33 |
| 6 | Diagnostics for Momentum Modules | 99 |

Addressing Momentum Modules

5

Aim of this Chapter

This chapter provides necessary information for configuring Momentum modules via the PL7 software.

What's in this Chapter?

This chapter contains the following sections:

| Section | Topic | Page |
|---------|---------------------------------------------------|------|
| 5.1 | Configuration in PL7 | 34 |
| 5.2 | Addressing I/O Discrete Momentum Standard Modules | 38 |
| 5.3 | Addressing Advanced Momentum Modules | 61 |
| 5.4 | Addressing Mixed Modules | 78 |
| 5.5 | Addressing a Special Module: 170 AEC 920 00 | 86 |

5.1 Configuration in PL7

Configuration of Momentum Modules in PL7

At a Glance

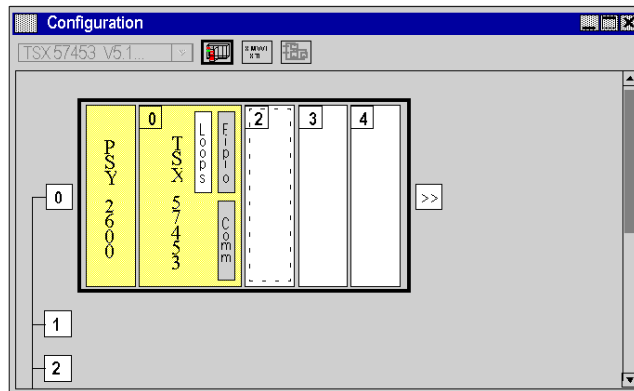
This document describes access modes, entry of the configuration and access syntax for I/O objects.

The example below shows a configuration procedure for the TSX 170 ANR 120 90 module in PL7.

PL7 Configuration

To correctly configure the hardware (rack, power supply, processor):

Illustration of the Configuration screen:



- Double-click the processor's FIPIO icon.
- Add the TSX 170 ANR 120 90 Momentum module.

Click the 170 ANR 120 90 module:

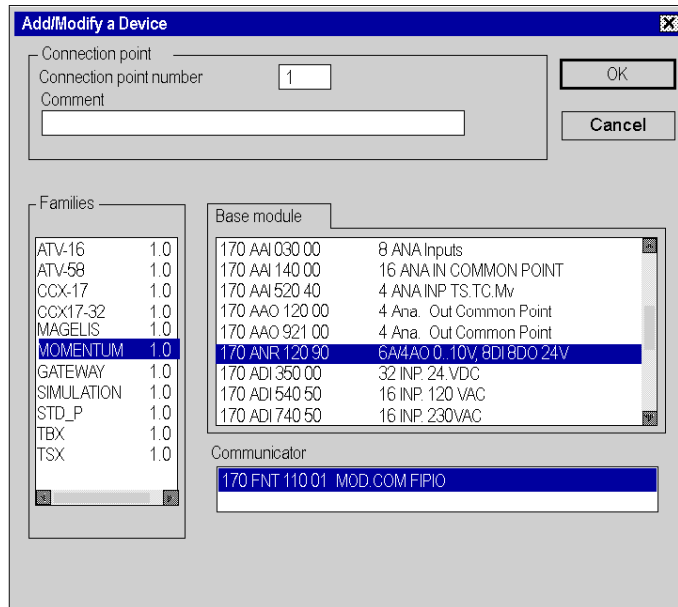
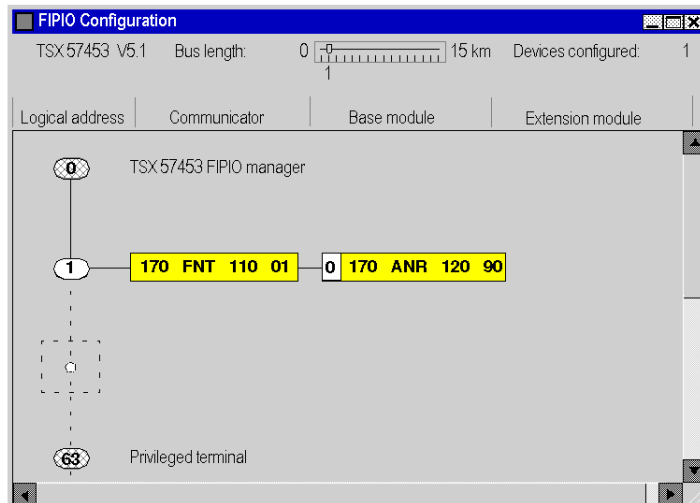


Illustration of the FIPIO Configuration screen:

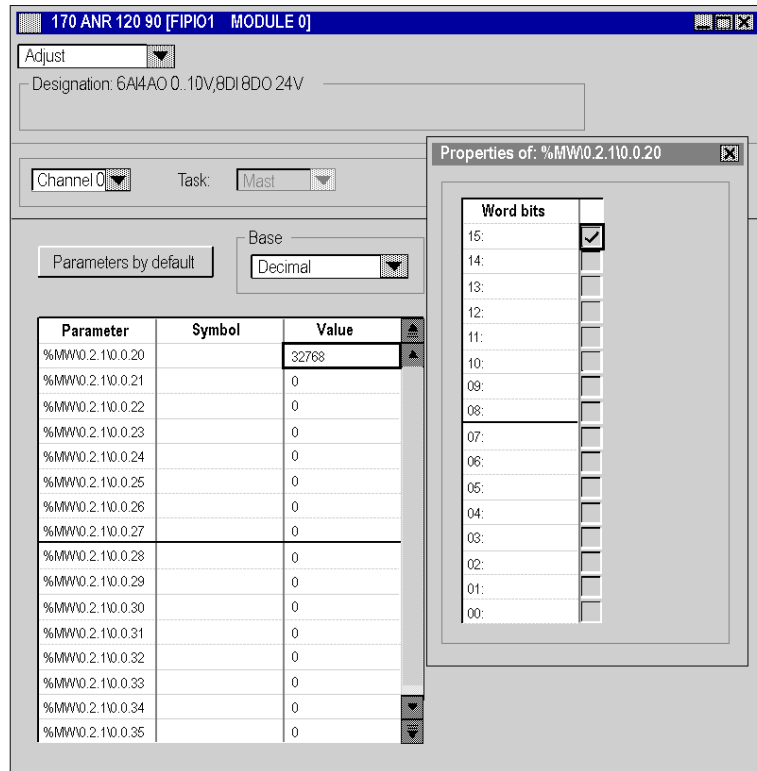


- Double-click 170 ANR 120 90.

NOTE: In configuration mode, the %KW in the Parameters field **cannot be used**. Do not enter any values.

- Position the cursor on Adjust mode.

Illustration of the Momentum configuration screen:



- Double-click the Value entry field in order to configure the value of the word bits (see page 81).

Reminder About Addressing Objects on FIPIO

- $\%I\backslash p.2.c\backslash j.i$: discrete input bit
- $\%Q\backslash p.2.c\backslash j.i$: discrete output bit
- $\%MW\backslash p.2.c\backslash j.v.r$: 16 bit parameters word
- $\%IW\backslash p.2.c\backslash j.v.r$: 16 bit input word
- $\%QW\backslash p.2.c\backslash j.v.r$: 16 bit output word

where:

p = position of the processor in the rack (0 or 1)

c = connection point number

j = 0 base module

j = 1 extension module – not used with Momentum

v = channel = 0 for Momentum

r = rank of a word in the channel

i = rank of the bit

5.2 Addressing I/O Discrete Momentum Standard Modules

Aim of this Section

This section provides information about the configuration of discrete input/output Momentum modules on Fipio.

What's in this Section?

This section contains the following topics:

| Topic | Page |
|--------------------------------|------|
| 16-Channel Input Modules | 39 |
| 32-Channel Input Module | 42 |
| 16-Channel Output Modules | 44 |
| 8-Channel Output Modules | 46 |
| 6-Channel Output Module | 48 |
| 32-Channel Output Module | 49 |
| Mixed Input and Output Modules | 51 |

16-Channel Input Modules

Assignment of the Data Bits

The inputs are connected to connector 1 on the base.

List of Momentums with 16 inputs:

- **170 ADI 340 00** (16 discrete inputs in 1 group, 24 VDC)
- **170 ADI 540 50** (16 discrete inputs in 2 groups, 120 VAC)
- **170 ADI 740 50** (16 discrete inputs in 2 groups, 230 VAC)

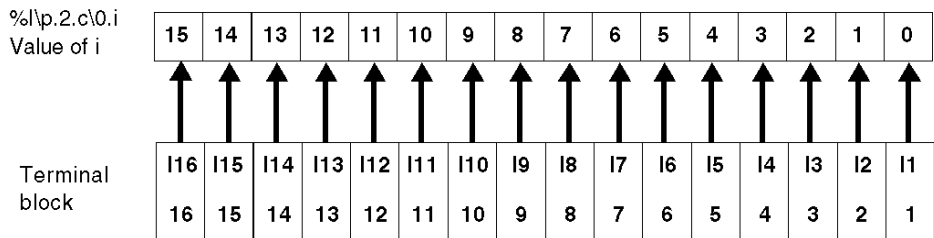
Input Values

The image of the input channels is accessible bit by bit:

`%I\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= number of the connection point).

Illustration:



Bits 16 to 31 are accessible by program but are not significant.

Labeling of the Terminal Blocks

170 ADI 340 00:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|--------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...17 | Sensor power supply |
| | 18 | +24 VDC for inputs |
| 3 | 1...17 | 0V for sensors (3- and 4-wire) |
| | 18 | 0V for inputs |
| 4 | 1...18 | Protective earth (PE) |

170 ADI 540 50:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | Reference potential – 120 VAC for the base (N) |
| | 18 | Base power supply 120 VAC (L1) |
| 2 | 1...8 | Power supply for input group 1 (1L1) |
| | 9...16 | Power supply for input group 2 (2L1) |
| | 17 | Power supply for input group 1 (1L1) |
| | 18 | Power supply for input group 2 (2L1) |
| 3 | 1...8 | Input group 1 – Reference potential (1N) |
| | 9...16 | Input group 2 – Reference potential (2N) |
| | 17 | Reference potential for input group 1 (1N) |
| | 18 | Reference potential for input group 2 (2N) |

170 ADI 740 50:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | Reference potential – 230 VAC for the base (N) |
| | 18 | Base power supply 230 VAC (L1) |
| 2 | 1...8 | Power supply for input group 1 (1L1) |
| | 9...16 | Power supply for input group 2 (2L1) |
| | 17 | Power supply for input group 1 (1L1) |
| | 18 | Power supply for input group 2 (2L1) |
| 3 | 1...8 | Input group 1 – Reference potential (1N) |
| | 9...16 | Input group 2 – Reference potential (2N) |
| | 17 | Reference potential for input group 1 (1N) |
| | 18 | Reference potential for input group 2 (2N) |

32-Channel Input Module

Assignment of the Data Bits

Inputs 1 to 16 are connected to terminal block 1 on the base. Inputs 17 to 32 are connected to terminal block 2.

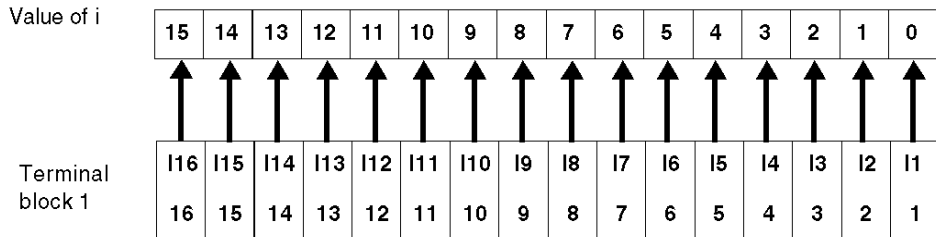
Input Values

The image of the input channels is accessible bit by bit:

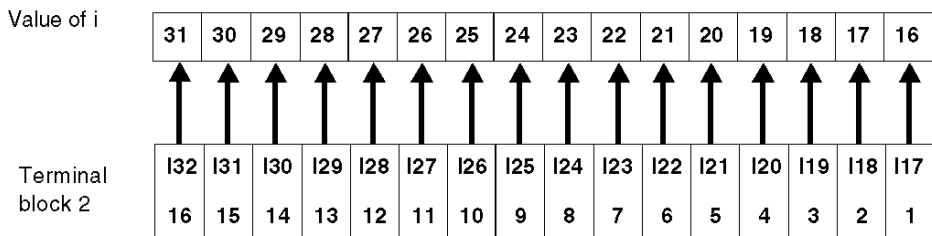
`%\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= number of the connection point).

Inputs 1 to 16:



Inputs 17 to 32:



Labeling of the Terminal Blocks

| Connectors | Terminal Number | Meaning |
|-------------------|------------------------|--------------------------------------------------------|
| 1 | 1...16 | Inputs for group 1 |
| | 17 | 0V (M-) |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...16 | Inputs for group 2 |
| | 17/18 | 24 VDC for input group 1 (1L+) and input group 2 (2L+) |
| 3 | 1...16 | Power supply for inputs 1 16 |
| | 17/18 | 0V (M-) |
| 4 | 1...18 | Power supply for inputs 17 32 |
| 5 | 1...18 | 0V (M-) |
| 6 | 1...18 | 0V (M-) or protective earth (PE) |

16-Channel Output Modules

Assignment of the Data Bits

The outputs are connected to connector 2 on the base.

List of Momentums with 16 outputs:

- **170 ADO 740 50** (16 discrete outputs in 2 groups (8 outputs/group), 230 VAC)
- **170 ADO 540 50** (16 discrete outputs in 2 groups (8 outputs/group), 120 VAC)
- **170 ADO 340 00** (16 discrete outputs in 2 groups (8 outputs/group), 24 VAC)

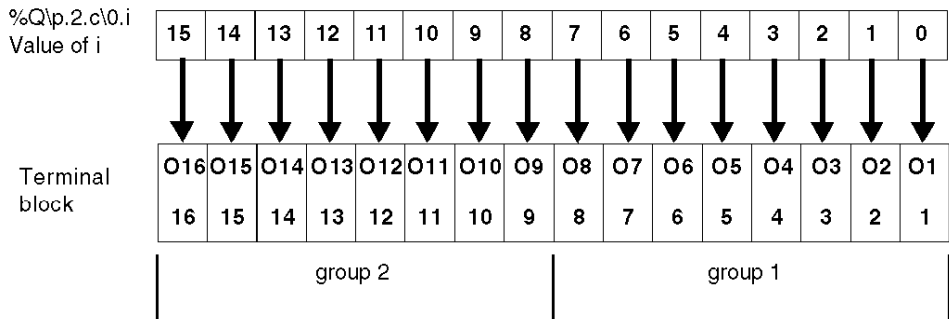
Output Values

The image of the output channels is sent to the communicator bit by bit:

`%Q\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= number of the connection point).

Illustration:



Labeling of the Terminal Blocks

170 ADO 740 50:

| Connectors | Terminal Number | Meaning |
|------------|-------------------|------------------------------------------------|
| 1 | Fuse 1, Fuse 2 | Output fuses |
| 2 | 1...8 | Outputs for group 1 |
| | 9...16 | Outputs for group 2 |
| | 17 | Reference potential for outputs (1N) |
| | 18 | Output power (1L1) |
| 3 | 1...16 | Reference potential per outputs (1N) |
| | 17 | Reference potential – 230 VAC for the base (N) |
| | 18 | Base power supply 230 VAC (L1) |

170 ADO 540 50:

| Connectors | Terminal Number | Meaning |
|------------|-------------------|------------------------------------------------|
| 1 | Fuse 1, Fuse 2 | Output fuses |
| 2 | 1...8 | Outputs for group 1 |
| | 9...16 | Outputs for group 2 |
| | 17 | Reference potential for outputs (1N) |
| | 18 | Output power (1L1) |
| 3 | 1...16 | Reference potential per outputs (1N) |
| | 17 | Reference potential – 120 VAC for the base (N) |
| | 18 | Base power supply 120 VAC (L1) |

170 ADO 340 00:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|-----------------------------------------------------------|
| 1 | Not used | |
| 2 | 1...8 | Outputs for group 1 |
| | 9...16 | Outputs for group 2 |
| | 17/18 | 24 VAC for group 1 outputs and group 2 outputs (1L+, 2L+) |
| 3 | 1...16 | 0V (M-) for outputs |
| | 17 | 0V (M-) for the base and outputs |
| | 18 | Supply voltage (L+) + 24 VDC |
| 4 | 1...18 | Protective earth (PE) |

8-Channel Output Modules

Assignment of the Data Bits

The outputs are connected to terminal block 2 on the base.

List of Momentums with 8 outputs:

- **170 ADO 730 50** (8 discrete outputs in 2 groups (4 outputs/group), 230 VAC)
- **170 ADO 530 50** (8 discrete outputs in 2 groups (4 outputs/group), 120 VAC)

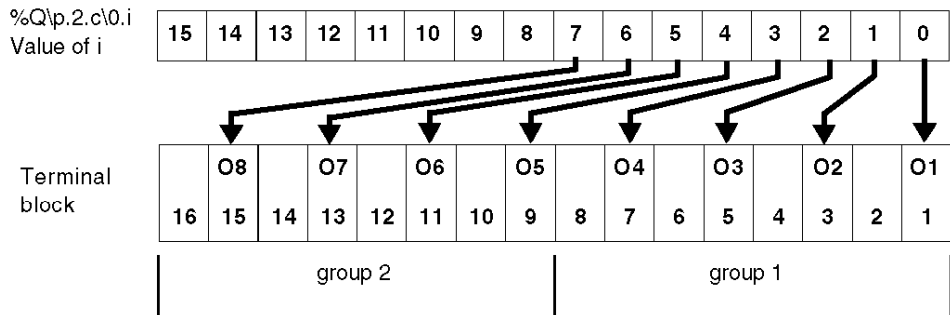
Output Values

The image of the output channels is sent to the communicator bit by bit:

`%Q\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= number of the connection point).

Illustration:



Labeling of the Terminal Blocks

170 ADO 730 50 and 170 ADO 530 50:

| Connectors | Terminal Number | Meaning |
|------------|-------------------|--------------------------------------|
| 1 | Fuse 1, Fuse 2 | Output fuses |
| 2 | 1, 3, 5, 7 | Outputs for group 1 |
| | 9, 11, 13, 15 | Outputs for group 2 |
| | 17 | Reference potential for outputs (1N) |
| | 18 | Output power (1L1) |
| 3 | 1...16 | Reference potential per outputs (1N) |
| | 17 | Reference potential* for base (N) |
| | 18 | Base power supply* (L1) |

* : 120 VAC for 170 ADO 530 50 or 230 VAC for 170 ADO 730 50

6-Channel Output Module

Data Bit Assignment

List of 6-output momentums:

170 ADO 830 30 (6 discrete outputs in 6 groups (1 outputs/group), 120-230 VAC)

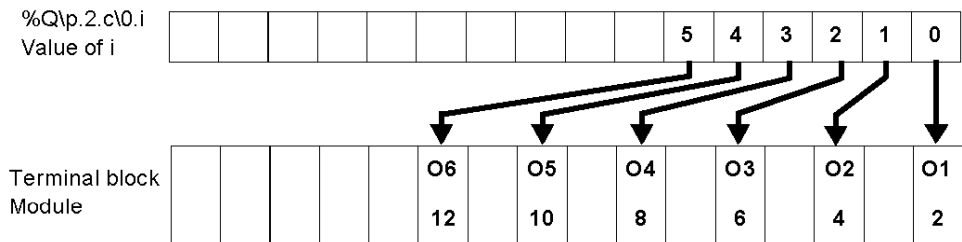
Output Values

Output channel image sent to the communicator bit by bit:

$\%Q\backslash p.2.c\backslash 0.i$, where i varies from 0 to 5.

(Reminder: p = position of the processor in the rack, c = connection point number).

Illustration:



Terminal Block Labeling

170 ADO 830 30:

| Connectors | Terminal Number | Meaning |
|------------|--------------------|-----------------------------------------------|
| 1 | 2, 4, 6, 8, 10, 12 | Relay outputs 1 to 6 (normally open) |
| | 17 | module neutral |
| | 18 | Module power supply (between 120 and 230 VAC) |
| 2 | 2, 4, 6, 8, 10, 12 | Relay outputs 1 to 6 (normally closed) |
| 3 | 2, 4, 6, 8, 10, 12 | Shared by relay outputs 1 to 6 |
| 4 | 1 ... 18 | Protective earth (PE) |

32-Channel Output Module

Assignment of the Data Bits

Inputs 1 to 16 are connected to terminal block 1 on the base. Inputs 17 to 32 are connected to terminal block 2.

170 ADO 350 00 (32 discrete outputs in 2 groups (16 outputs/group), 24 VDC)

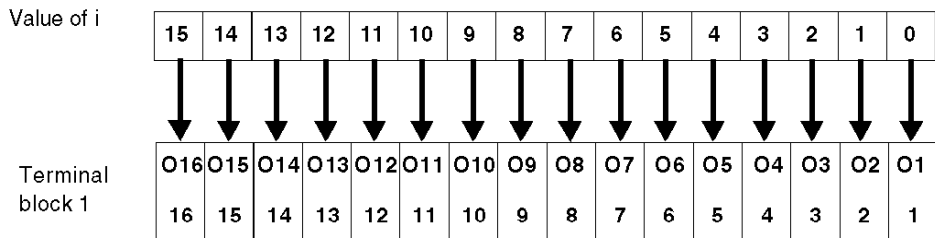
Output Values

The image of the output channels is sent to the communicator via an output word:

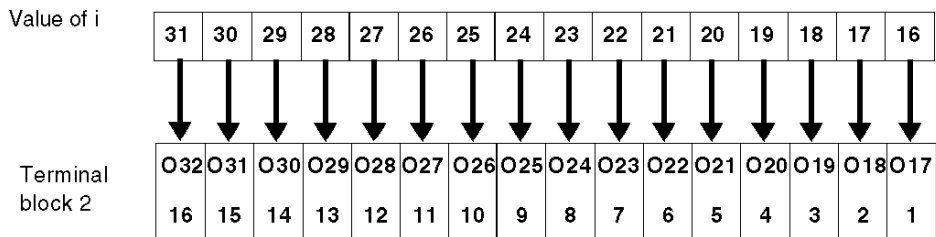
`%Q\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= number of the connection point).

Outputs 1 to 16:



Outputs 17 to 32:



Labeling of the Terminal Blocks

| Connectors | Terminal Number | Meaning |
|-------------------|------------------------|----------------------------------------------------------|
| 1 | 1...16 | Outputs for group 1 |
| | 17 | 0V (M-) for the base |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...16 | Outputs for group 2 |
| | 17/18 | 24 VDC for output group 1 (1L+) and output group 2 (2L+) |
| 3 | 1...16 | 0V (M-) for outputs |
| | 17/18 | 0V (M-) for output groups |
| 4 | 1...18 | 0V (M-) |
| 5 | 1...18 | Protective earth (PE) |
| 6 | 1...18 | Protection ground |

Mixed Input and Output Modules

16I/16O Modules

Outputs connected to base terminal block 2. Inputs connected to base terminal block 1.

List of Momentums:

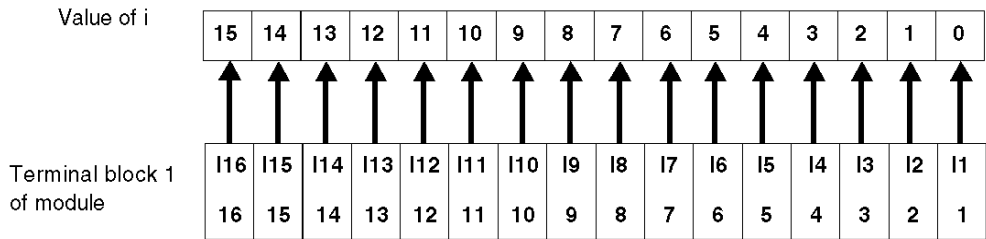
- 170 ADM 350 10
- 170 ADM 350 11
- 170 ADM 350 15
- 170 ADM 850 10

Input channel image accessible bit by bit:

`%\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= connection point number).

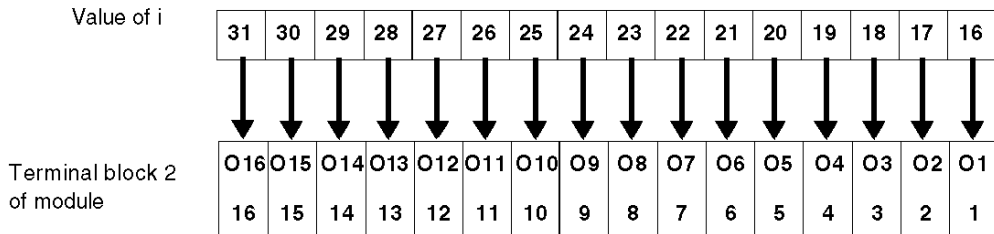
Inputs:



Output channel image sent to the communicator bit by bit:

`%Q\p.2.c\0.i`

Outputs:



Terminal block labeling for bases **170 ADM 35010** and **170 ADM 35011**:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|----------------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...8 | Output Group 1 |
| | 9...16 | Output Group 2 |
| | 17/18 | 24 VDC for output group 1 (1L+) and output group 2 (2L+) |
| 3 | 1...16 | 0V for outputs |
| | 17/18 | 0V (M-) |
| 4 | 1...18 | Power supply for inputs I1 I16 or PE |
| 5 | 1...18 | 0V (M-) |
| 6 | 1...18 | Protective earth (PE) |

Terminal block labeling for base **170 ADM 350 15**:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|----------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Supply voltage + 24 VDC for the inputs |
| 2 | 1...16 | Outputs |
| | 17 | 0V for outputs |
| | 18 | 24 VDC for outputs |
| 3 | 1...16 | 24 VDC for outputs (2L+) |
| | 17 | 0V (M-) |
| | 18 | Supply voltage + 24 VDC |
| 4 | 1...18 | 0V (M-) |

Terminal block labeling for base **170 ADM 850 10**:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|-------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Power supply voltage between 10VDC and 60VDC |
| 2 | 1...16 | Outputs |
| | 17 | 0V (M-) |
| | 18 | Power supply voltage between 10VDC and 60VDC |
| 3 | 1...16 | Output return connections |
| | 17 | 0V (M-) |
| | 18 | Input reference voltage between 10VDC and 60VDC |

Modules 16I/8O**170 ADM 370 10**

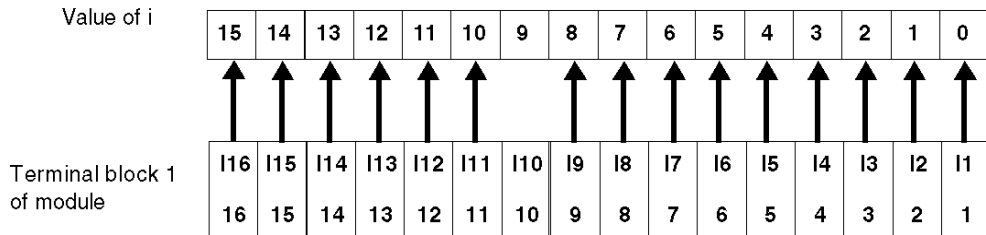
Output connections to base terminal block 2. Input connections to base row 1.

Input channel image accessible bit by bit:

`%I\p.2.c\0.i`

(Reminder: p= position of the processor in the rack, c= connection point number).

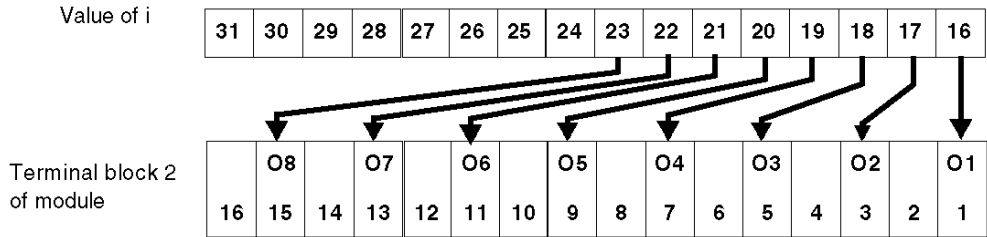
Inputs:



Output channel image sent to the communicator bit by bit:

`%Q\p.2.c\0.i`

Outputs:



Bits 24 to 31 (%Q\p.2.c\0.i) can be accessed by the program, but they are not significant and their value is ignored by the communicator.

Terminal block labeling:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|----------------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1, 3, 5, 7 | Output Group 1 |
| | 9, 11, 13, 15 | Output Group 2 |
| | 2, 4, 6, 8 | 0V (1M-) for Output Group 1 |
| | 10, 12, 14, 16 | 0V (2M-) for Output Group 2 |
| | 17/18 | 24 VDC for Output Group 1 (1L+) and Output Group 2 (2L+) |
| 3 | 1...4 | Power supply for inputs 1 4 (L+) |
| | 5...8 | Power supply for inputs 5 8 (L+) |
| | 8...12 | Power supply for inputs 9 12 (L+) |
| | 13...16 | Power supply for inputs 13 16 (L+) |
| | 17/18 | 0V (1M-, 2M-) |
| 4 | 1...18 | 0V (M-) for the sensors |
| 5 | 1...18 | Protective earth (PE) |

Modules 16 I/12 O**170 ADM 390 10**

Master sends 12 discrete output bits to base 170 ADM 390 10 in a 16 bit word. Base returns three 16 bit input words to the master.

Fault detection:

First two words return input and output fault detection. First input word indicates fault detection for the 12 outputs.

Second input word indicates fault detection for the 16 inputs.

I/O register assignments:

Third input word is for the sensors. Sensors are connected to base connector 1. Actuators (from the output word) are connected to base terminal block 2.

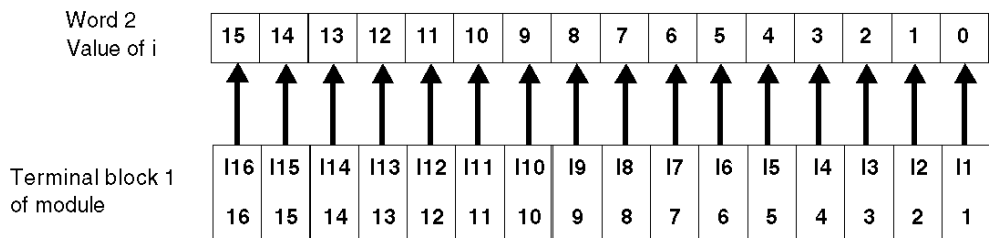
| Address | Description | Bit |
|----------------|--------------------|-----------|
| %IWp.2.c\0.0.0 | Output status word | 0 = OK |
| %IWp.2.c\0.0.1 | Input status word | 1 = fault |
| %IWp.2.c\0.0.2 | Input value word | |

| Address | Description |
|----------------|-------------|
| %QWp.2.c\0.0.0 | Output word |

Input channel image is accessible in an input word:

%IWp.2.c\0.0.2:xi

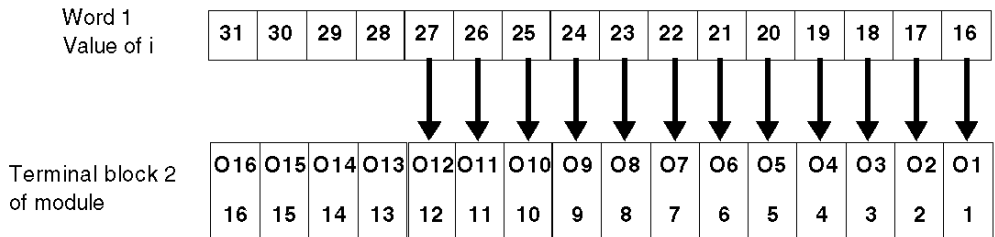
Inputs:



Output channel image is sent to the communicator bit by bit:

%QWp.2.c\0.0.0:xi

Outputs:



Terminal block labeling:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|---------------------------------------------------------|
| 1 | 1...16 | Inputs |
| | 17 | 0V (M-) |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...8 | Output Group 1 |
| | 9...12 | Output Group 2 |
| | 13...16 | Not Connected |
| | 17/18 | 24 VDC for Output Group 1 and Output Group 2 (1L+, 2L+) |
| 3 | 1...18 | 0V (M-) |
| 4 | 1...18 | Supply voltage for terminals 1 16, connector 1, or PE |

Modules 10I/8O

Outputs connected to base terminal block 2, and inputs to terminal block 1.

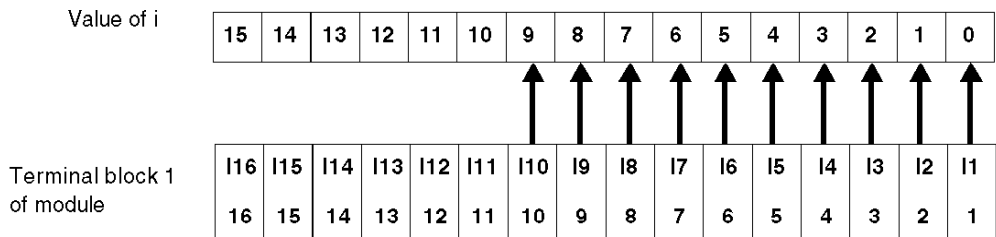
List of Momentums with 10 inputs and 8 outputs (10 discrete inputs in 1 group and 8 relay NO outputs in 2 groups (4 outputs/group)):

- **170 ADM 390 30**
- **170 ARM 370 30**

Input channel image is accessible via:

`%I\p.2.c\0.i`

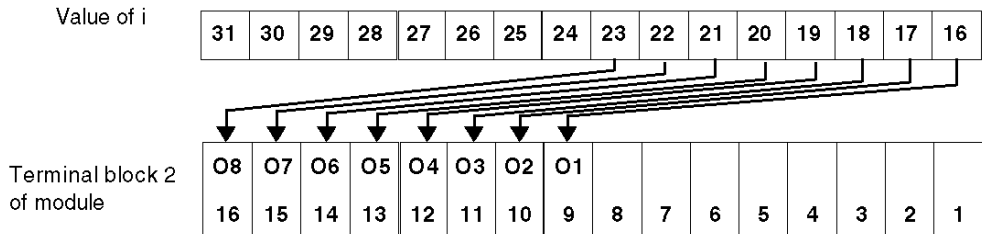
Inputs:



Output channel image sent to the communicator via:

`%Q\p.2.c\0.i`

Outputs:



170 ADM 390 30 terminal block labeling:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|--------------------------------------------------------------------------------|
| 1 | 1...10 | Inputs |
| | 11, 12, 16 | Power supply for inputs 9, 10 (1L+) |
| | 13, 14, 15 | 0V (M-) for inputs |
| | 17 | 0V (M-) for the base |
| | 18 | Supply voltage (L+) + 24 VDC |
| 2 | 1...8 | Output power supply 1 ... 8 (1L+) |
| | 9...12 | Output Group 1 |
| | 13...16 | Output Group 2 |
| | 17 | Power supply for relay outputs 1 ... 4 (1L1, 20 ... 115 VDC or 24 ... 230 VAC) |
| | 18 | Power supply for relay outputs 5 ... 8 (2L1, 20 ... 115 VDC or 24 ... 230 VAC) |
| 3 | 1...8 | 0V (M-) for inputs |
| | 9, 10, 11, 12 | 0V (1N) for relays 1 4 |
| | 13, 14, 15, 16 | 0V (2N) for relays 5 8 |
| | 17/18 | 0V/Reference potential for relay outputs |
| 4 | 1...18 | Protective earth (PE) |

170 ARM 370 30 terminal block labeling:

| Connectors | Terminal Number | Meaning |
|------------|-----------------|----------------------------------------------------------|
| 1 | 1...10 | Inputs |
| | 11, 12 | Input power supply (L+) |
| | 13, 14 | 0V (M-) for inputs |
| | 15, 16 | Not used |
| | 17 | 0V (M-) for the base |
| | 18 | Base power supply (L1) 120 VAC |
| 2 | 1...8 | Input power supply (L+) |
| | 9...12 | Output Group 1 |
| | 13...16 | Output Group 2 |
| | 17 | Relay output voltage (1L1, 20...115 VDC or 24...230 VAC) |
| | 18 | Relay output voltage (2L1, 20...115 VDC or 24...230 VAC) |

| Connectors | Terminal Number | Meaning |
|------------|-----------------|------------------------------------------|
| 3 | 1...8 | 0V (M-) for inputs |
| | 9, 10, 11, 12 | 0V (1N) for relays |
| | 13, 14, 15, 16 | 0V (2N) for relays |
| | 17/18 | 0V/Reference potential for relay outputs |

List of Momentums with 10 inputs and 8 outputs (10 discrete inputs in 1 group and 8 triac outputs in 1 group (1 fuse for 4 outputs)):

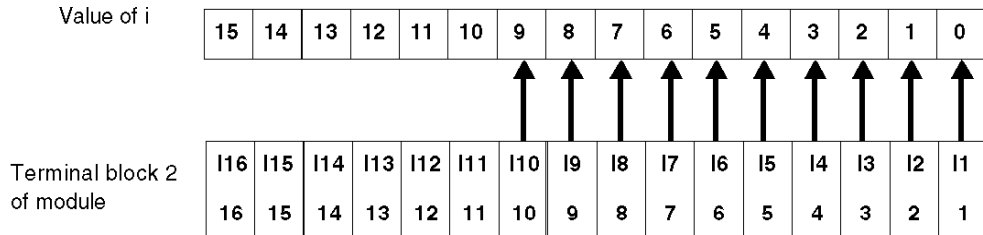
- **170 ADM 690 50**
- **170 ADM 690 51**

Outputs are connected to base terminal block 2, and inputs to terminal block 1.

Input channel image accessible via:

`%I\p.2.c\0.i`

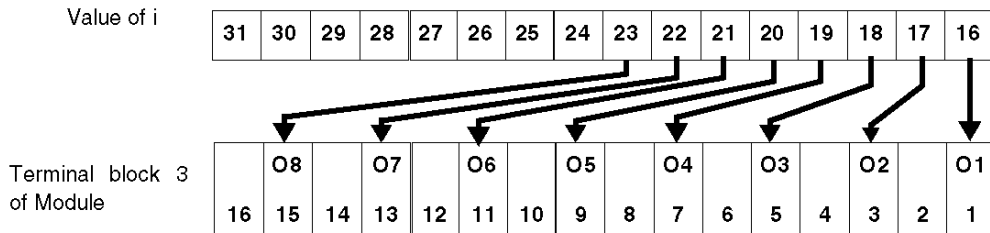
Inputs:



Output channel image sent to the communicator via:

`%Q\p.2.c\0.i`

Outputs:



Bits 24 to 31 (`%Q\p.2.c\0.i`) can be accessed by the program, but they are not significant and their value is ignored by the communicator.

Terminal block labeling:

| Connectors | Terminal Number | Meaning |
|------------|----------------------------|-----------------------------------------------------------------------------------------|
| 1 | Fuse 1, Fuse 2 | Internal fuses for output power supply |
| 2 | 1...10 | Inputs |
| | 11...14 | Connected internally, directly on the connector. Connection order is not pre-determined |
| | 15...16 | 0V (N) for sensors |
| | 17 | 0V (N) |
| | 18 | 120 VAC power supply (L1) |
| 3 | 1, 3, 5, 7, 9, 11, 13, 15 | Outputs |
| | 2, 4, 6, 8, 10, 12, 14, 16 | 0V (1N) for actuators |
| | 17 | 0V for outputs |
| | 18 | 20 ... 132 VAC power supply for outputs 1 - 8 (1L1) |
| 4 | 1...18 | 120 VAC input power supply (2L1) |
| 5 | 1...18 | 0V (2N) for sensors |
| 6 | 1...18 | Protective earth (PE) |

5.3 Addressing Advanced Momentum Modules

Aim of this Section

This section provides information about the configuration of analog inputs/outputs (or assimilated) Momentum modules on Fipio.

What's in this Section?

This section contains the following topics:

| Topic | Page |
|-----------------------|------|
| Module 170 AAI 140 00 | 62 |
| Module 170 AAI 030 00 | 64 |
| Module 170 AAI 520 40 | 66 |
| Module 170 AMM 090 00 | 70 |
| Module 170 AAO 120 00 | 74 |
| Module 170 AAO 921 00 | 76 |

Module 170 AAI 140 00

Input Values

The module has 16 analog inputs.

At input, the analog values are read in one word per channel. Therefore, the **170 AAI 140 00** base uses 16 contiguous words. The sign is always assigned to bit 15 of the word.

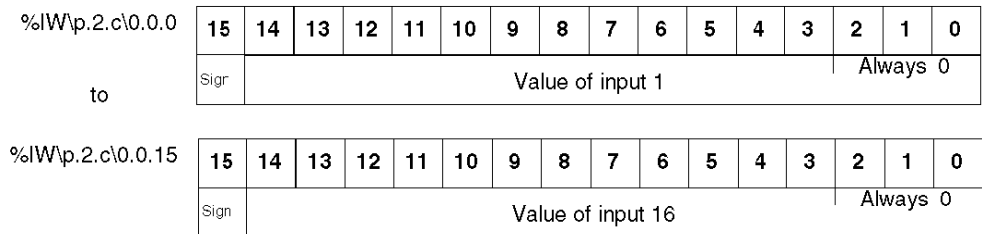
The value is justified to the left.

The representation format is 2's complement binary.

The numerical analog conversion is done on 12 bits + polarity sign (bipolar ranges).

Bits 2 ... 0 are not used and are always set to 0. The result of this is that the read value will be modified in increments of 8 units.

Illustration:



Parameters

These parameters are sent to the module via the communicator, in the form of words for configuring the input functioning mode. Each 4 bit byte of a word corresponds to an analog channel.

The order of the 4 bit bytes is as follows:

| | | | | | | | | | | | | | | | | |
|------------------|---------|----|----|----|---------|----|---|---|---------|---|---|---|-----------|---|---|---|
| %MW\p.2.c\0.0.20 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 4 | | | | Chan 3 | | | | Chan 2 | | | | Channel 1 | | | |
| %MW\p.2.c\0.0.21 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 8 | | | | Chan 7 | | | | Chan 6 | | | | Chan 5 | | | |
| %MW\p.2.c\0.0.22 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 12 | | | | Chan 11 | | | | Chan 10 | | | | Chan 9 | | | |
| %MW\p.2.c\0.0.23 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 16 | | | | Chan 15 | | | | Chan 14 | | | | Chan 13 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|-------------------------------------|----------------------|------------------|
| 2#0000 | 0 | reserved |
| 2#1010 | A | +/-5 VDC |
| 2#1011 | B | +/-10 VDC |
| 2#1100 | C | inactive channel |
| 2#1110 | E | 4...20 mA |

NOTE: Any parameter value not indicated in the table above is not permitted. The module continues to work with the last valid parameters it received.

Module 170 AAI 030 00

Input Values

The module has 8 analog inputs.

At input, the analog values are read in one word per channel. Therefore, the **170 AAI 030 00** base uses 8 contiguous words. The sign is always assigned to bit 15 of the word.

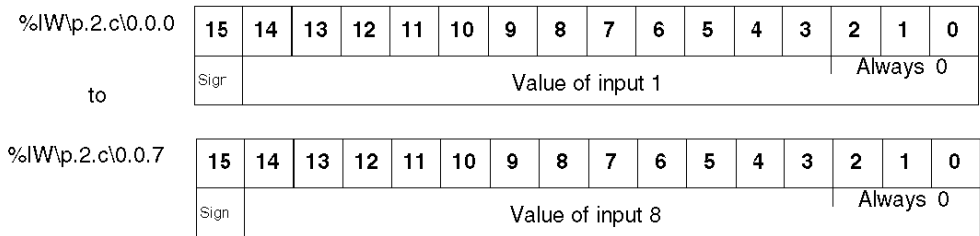
The value is justified to the left.

The representation format is 2's complement binary.

The numerical analog conversion is done on 12 bits + polarity sign.

Bits 2 ... 0 are not used and are always set to 0. The result of this is that the read value will be modified in increments of 8 units.

Illustration:



Parameters

These parameters are sent to the module via the communicator, in the form of words for configuring the input functioning mode. Each 4 bit byte of a word corresponds to an analog channel.

The order of the 4 bit bytes is as follows:

| | | | | | | | | | | | | | | | | |
|-----------------|--------|----|----|----|--------|----|---|---|--------|---|---|---|-----------|---|---|---|
| %MW\p.2.c\0.0.4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 4 | | | | Chan 3 | | | | Chan 2 | | | | Channel 1 | | | |

| | | | | | | | | | | | | | | | | |
|-----------------|--------|----|----|----|--------|----|---|---|--------|---|---|---|--------|---|---|---|
| %MW\p.2.c\0.0.5 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 8 | | | | Chan 7 | | | | Chan 6 | | | | Chan 5 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|-------------------------------------|----------------------|-------------------------|
| 2#0000 | 0 | reserved |
| 2#0010 | 2 | +/-5 VDC and +/-20 mA |
| 2#0011 | 3 | +/-10 VDC |
| 2#0100 | 4 | inactive channel |
| 2#1001 | 9 | 1...5 VDC and 4...20 mA |

NOTE: Any parameter value not indicated in the table above is not permitted. The module continues to work with the last valid parameters it received.

Module 170 AAI 520 40

Input Values

The module has 4 analog inputs TS, TC, Mv.

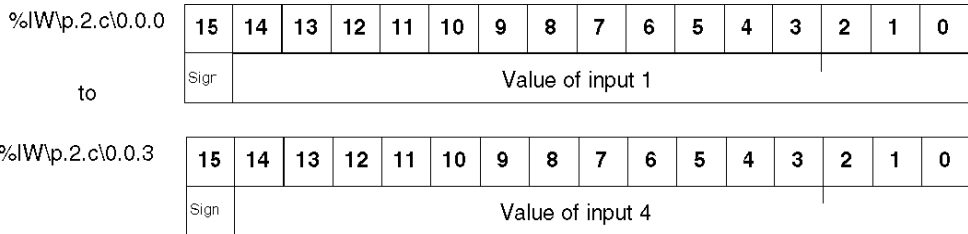
At input, the analog values are read in one word per channel. Therefore, the **170 AAI 520 40** base uses 4 contiguous words. The sign is always assigned to bit 15 of the word.

The value is justified to the left.

The representation format is 2's complement binary.

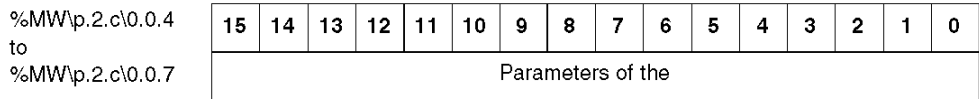
The numerical analog conversion is done on 15 bits + polarity sign.

Illustration:



Parameters

These parameters are sent to the module via the communicator, in the form of words for configuring the input functioning mode. The parameter corresponds: to the type of sensor, the choice of temperature unit, the necessity of a wiring check.



Thermocouple ranges:

| Range | Temperature | Wiring Check | Parameter Word (Hex) |
|----------------|----------------|--------------|----------------------|
| Thermocouple B | 1/10 degrees C | inactive | 2201 |
| | | active | 2301 |
| | 1/10 degrees F | inactive | 2281 |
| | | active | 2381 |

| Range | Temperature | Wiring Check | Parameter Word (Hex) |
|----------------|----------------|--------------|----------------------|
| Thermocouple E | 1/10 degrees C | inactive | 1202 |
| | | active | 1302 |
| | 1/10 degrees F | inactive | 1282 |
| | | active | 1382 |
| Thermocouple J | 1/10 degrees C | inactive | 1203 |
| | | active | 1303 |
| | 1/10 degrees F | inactive | 1283 |
| | | active | 1383 |
| Thermocouple K | 1/10 degrees C | inactive | 1204 |
| | | active | 1304 |
| | 1/10 degrees F | inactive | 1284 |
| | | active | 1384 |
| Thermocouple N | 1/10 degrees C | inactive | 1205 |
| | | active | 1305 |
| | 1/10 degrees F | inactive | 1285 |
| | | active | 1385 |
| Thermocouple R | 1/10 degrees C | inactive | 2206 |
| | | active | 2306 |
| | 1/10 degrees F | inactive | 2286 |
| | | active | 2386 |
| Thermocouple S | 1/10 degrees C | inactive | 2207 |
| | | active | 2307 |
| | 1/10 degrees F | inactive | 2287 |
| | | active | 2387 |
| Thermocouple T | 1/10 degrees C | inactive | 2208 |
| | | active | 2308 |
| | 1/10 degrees F | inactive | 2288 |
| | | active | 2388 |

Ranges PT100, PT1000, Ni 100 and Ni 1000:

| Range | Wiring | Temperature | Wiring Check | Parameter Word (Hex) |
|-------------------|--------------|----------------|--------------|----------------------|
| IEC PT100 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0A20 |
| | | | active | 0B20 |
| | | 1/10 degrees F | inactive | 0AA0 |
| | | | active | 0BA0 |
| | 3 wires | 1/10 degrees C | inactive | 0E20 |
| | | | active | 0F20 |
| 1/10 degrees F | inactive | 0221 | | |
| | active | 0321 | | |
| IEC PT1000 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0221 |
| | | | active | 0321 |
| | | 1/10 degrees F | inactive | 02A1 |
| | | | active | 03A1 |
| | 3 wires | 1/10 degrees C | inactive | 0621 |
| | | | active | 0721 |
| 1/10 degrees F | inactive | 06A1 | | |
| | active | 07A1 | | |
| US/JIS PT100 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0A60 |
| | | | active | 0B60 |
| | | 1/10 degrees F | inactive | 0AE0 |
| | | | active | 0BE0 |
| | 3 wires | 1/10 degrees C | inactive | 0E60 |
| | | | active | 0F60 |
| 1/10 degrees F | inactive | 0EE0 | | |
| | active | 0FE0 | | |
| US/JIS PT1000 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0261 |
| | | | active | 0361 |
| | | 1/10 degrees F | inactive | 02E1 |
| | | | active | 03E1 |
| | 3 wires | 1/10 degrees C | inactive | 0661 |
| | | | active | 0761 |
| 1/10 degrees F | inactive | 06E1 | | |
| | active | 07E1 | | |

| Range | Wiring | Temperature | Wiring Check | Parameter Word (Hex) |
|-----------------|--------------|----------------|--------------|----------------------|
| DIN Ni 100 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0A23 |
| | | | active | 0B23 |
| | | 1/10 degrees F | inactive | 0AA3 |
| | | | active | 0BA3 |
| | 3 wires | 1/10 degrees C | inactive | 0E23 |
| | | | active | 0F23 |
| | | 1/10 degrees F | inactive | 0EA3 |
| | | | active | 0FA3 |
| DIN Ni 1000 RTD | 2 or 4 wires | 1/10 degrees C | inactive | 0222 |
| | | | active | 0322 |
| | | 1/10 degrees F | inactive | 02A2 |
| | | | active | 03A2 |
| | 3 wires | 1/10 degrees C | inactive | 0622 |
| | | | active | 0722 |
| | | 1/10 degrees F | inactive | 06A2 |
| | | | active | 07A2 |

Voltage ranges:

| Range | Wiring Check | Parameter Word (Hex) |
|----------|--------------|----------------------|
| +/-25mV | inactive | 2210 |
| | active | 2310 |
| +/-100mV | active | 1211 |
| | inactive | 1311 |

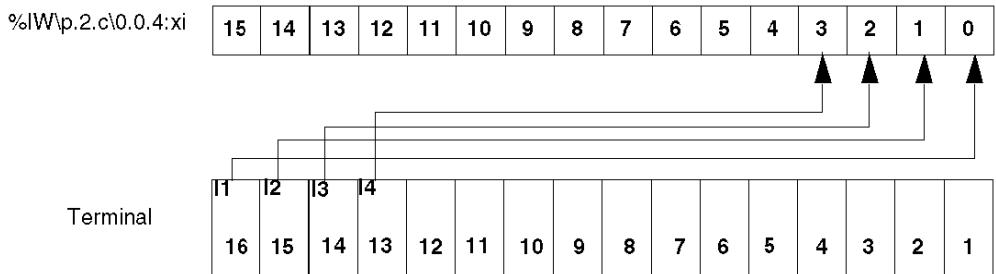
Module 170 AMM 090 00

Discrete Inputs

This mixed module has 4 analog inputs and 2 analog outputs, as well as 4 discrete inputs and 2 discrete outputs.

The **170 AMM 090 00** base sends four discrete input bits (and any detected fault messages) in a 16 bit word to the master. Inputs are connected to terminal block 2 on the base.

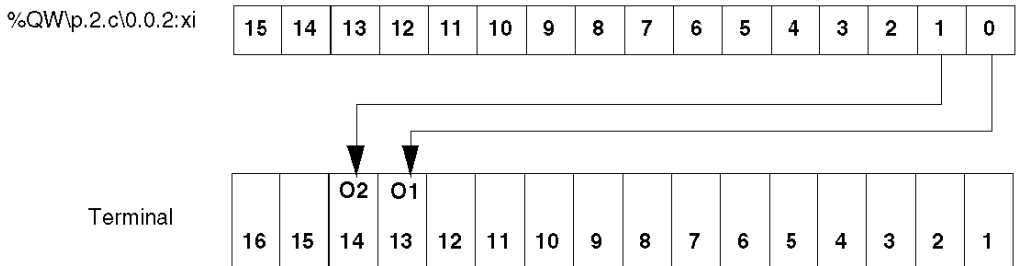
Illustration:



Discrete Outputs

The master sends 2 discrete outputs bits to the base in a unique 16 bit word. The outputs are connected to terminal block 3.

Illustration:



Analog Input Values

At input, the analog values are read in one word per channel. The **170 AMM 090 00** base uses 4 contiguous words. The sign is always assigned to bit 15 of the word.

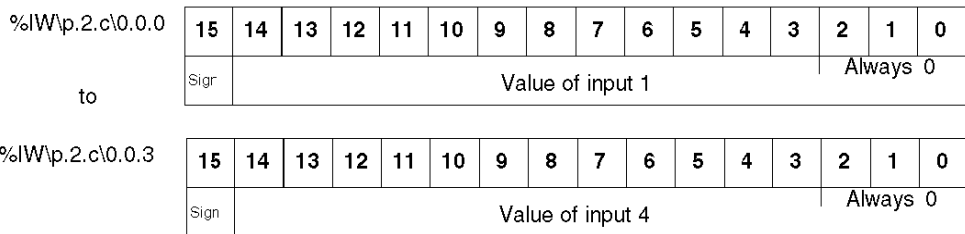
The value is justified to the left.

The representation format is 2's complement binary.

The numerical analog conversion is done on 12 bits + polarity sign (for bipolar ranges).

Bits 2 ... 0 are not used and are always set to 0. The result of this is that the read value will be modified in increments of 8 units.

Illustration:

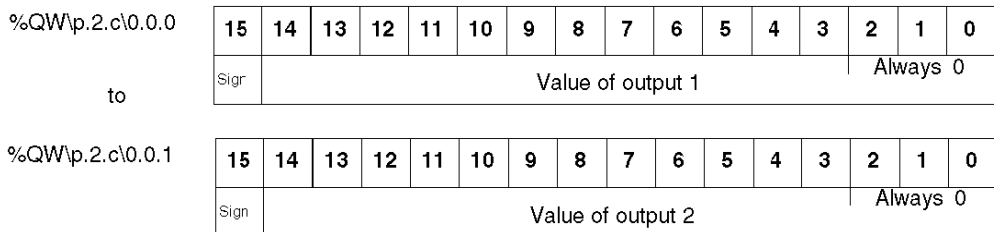


Analog Output Values

Analog output values are written in one word per channel. The base uses 2 contiguous words.

The format is identical to analog inputs.

Illustration:



Configuration Parameters for Analog Inputs

These parameters are sent to the module via the communicator, in the form of words for configuring the input functioning mode. Each 4 bit byte of a word corresponds to an analog channel.

The order of the 4 bit bytes is as follows:

%MW\p.2.c\0.0.4

| | | | | | | | | | | | | | | | |
|--------|----|----|----|--------|----|---|---|--------|---|---|---|--------|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Chan 4 | | | | Chan 3 | | | | Chan 2 | | | | Chan 1 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|-------------------------------------|----------------------|-----------------------|
| 2#0000 | 0 | reserved |
| 2#0010 | 2 | +/-5 VDC or +/- 20 mA |
| 2#0011 | 3 | +/-10 VDC |
| 2#0100 | 4 | inactive channel |
| 2#1010 | A | 1...5V or 4...20 mA |

Configurations of Fallback Values for Analog Outputs

These parameters are sent to the module via the communicator, in the form of words for configuring the output functioning mode. Every 4 bit byte of this word corresponds to an analog channel.

The order of the 4 bit bytes is as follows:

%MW\p.2.c\0.0.5

| | | | | | | | | | | | | | | | |
|----------|----|----|----|----------|----|---|---|--------|---|---|---|--------|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Reserved | | | | Reserved | | | | Chan 2 | | | | Chan 1 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|---------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2#0000 | 0 | reserved |
| 2#00x1 | 1 or 3 | Output configured to zero by default: sends a value to the base, obliging it to force the actuators to zero (0 V or 0 mA). |
| 2#01x1 | 5 or 7 | Output configured in the middle of the scale by default: sends a value to the base, obliging it to force the actuators to the value in the middle of the scale (+10 V or +20 mA). |
| 2#10x1 | 9 or B | Output configured to the last value displayed by default |
| x is equal to 0 or 1 indiscriminately | | |

NOTE: Any parameter value not indicated in the tables above is not permitted. The module continues to work with the last valid parameters it received.

Module 170 AAO 120 00

Output Values

This module has 4 0-20 mA analog outputs.

Analog output values are written in one word per channel. Therefore, the **170 AAO 120 00** base uses 4 contiguous words. The sign is always assigned to bit 15 of the word.

The value is justified to the left.

The representation format is 2's complement binary.

The numerical analog conversion is done on 12 bits + polarity sign (in +/-10 V).

Bits 2 ... 0 are not used and are always set to 0. The result of this is that the read value will be modified in increments of 8 units.

Illustration:

`%QWp.2.c\0.0.0`

to

`%QWp.2.c\0.0.3`

| | | | | | | | | | | | | | | | |
|------|-------------------|----|----|----|----|---|---|---|---|---|---|---|----------|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Sign | Value of output 1 | | | | | | | | | | | | Always 0 | | |

| | | | | | | | | | | | | | | | |
|------|-------------------|----|----|----|----|---|---|---|---|---|---|---|----------|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Sign | Value of output 4 | | | | | | | | | | | | Always 0 | | |

Configuration of Fallback Values for Analog Outputs

These parameters are sent to the module via the communicator, in the form of words for configuring the output functioning mode. Every 4 bit byte of this word corresponds to an analog channel.

The order of the 4 bit bytes is as follows

%MW\p.2.c\0.0.4

| | | | | | | | | | | | | | | | |
|--------|----|----|----|--------|----|---|---|--------|---|---|---|--------|---|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Chan 4 | | | | Chan 3 | | | | Chan 2 | | | | Chan 1 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|---------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2#0000 | 0 | reserved |
| 2#00x1 | 1 or 3 | Output configured to zero by default: sends a value to the base, obliging it to force the actuators to zero (0 V or 0 mA). |
| 2#01x1 | 5 or 7 | Output configured in the middle of the scale by default: sends a value to the base, obliging it to force the actuators to the value in the middle of the scale (+10 V or +20 mA). |
| 2#10x1 | 9 or B | Output configured to the last value displayed by default |
| x is equal to 0 or 1 indiscriminately | | |

NOTE: Any parameter value not indicated in the table above is not permitted. The module continues to work with the last valid parameters it received.

Module 170 AAO 921 00

Output Values

This module has 4 4-20 mA or 0-10 mA analog outputs.

Analog output values are written in one word per channel. Therefore, the **170 AAO 921 00** base uses 4 contiguous words. The sign is always assigned to bit 15 of the word.

The value is justified to the left.

The representation format is 2's complement binary.

The numerical analog conversion is done on 12 bits + polarity sign (in +/-10v).

Bits 2 ... 0 are not used and are always set to 0. The result of this is that the read value will be modified in increments of 8 units.

Illustration:

%QWp.2.c\0.0.0

| | | | | | | | | | | | | | | | |
|------|-------------------|----|----|----|----|---|---|---|---|---|---|---|----------|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Sign | Value of output 1 | | | | | | | | | | | | Always 0 | | |

to

%QWp.2.c\0.0.3

| | | | | | | | | | | | | | | | |
|------|-------------------|----|----|----|----|---|---|---|---|---|---|---|----------|---|---|
| 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| Sign | Value of output 4 | | | | | | | | | | | | Always 0 | | |

Configuration of Fallback Values

These parameters are sent to the module via the communicator, in the form of words for configuring the output functioning mode. Every 4 bit byte of this word corresponds to an analog channel.

The order of the 4 bit bytes is as follows:

| | | | | | | | | | | | | | | | | |
|----------------|--------|----|----|----|--------|----|---|---|--------|---|---|---|--------|---|---|---|
| %MWp.2.c\0.0.4 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| | Chan 4 | | | | Chan 3 | | | | Chan 2 | | | | Chan 1 | | | |

The value of each 4 bit byte is coded according to the following rules:

| Value of the 4-Bit Byte (in Binary) | Value in Hexadecimal | Meaning |
|---------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2#0000 | 0 | reserved |
| 2#00x1 | 1 or 3 | Output configured to zero by default: sends a value to the base, obliging it to force the actuators to zero (4 V or 0 mA). |
| 2#01x1 | 5 or 7 | Output configured in the middle of the scale by default: sends a value to the base, obliging it to force the actuators to the value in the middle of the scale (+10 V or +20 mA). |
| 2#10x1 | 9 or B | Output configured to the last value displayed by default |
| x is equal to 0 or 1 indiscriminately | | |

NOTE: Any parameter value not indicated in the table above is not permitted. The module continues to work with the last valid parameters it received.

5.4 Addressing Mixed Modules

Aim of this Section

This section provides information about the configuration of the 170 ANR 120 90 and 170 ANR 120 91 discrete and analog input/output Momentum modules on Fipio.

The Momentum 170 ANR 120 90 and 170 ANR 120 91 bases support the following inputs and outputs:

- six analog input channels
- four analog output channels
- eight discrete inputs
- eight discrete outputs

Full operation for the module is described in the base setup documentation **870 USE 002**.

What's in this Section?

This section contains the following topics:

| Topic | Page |
|------------------------------------------------|------|
| 170 ANR 120 90/91 Modules: Input Words | 79 |
| 170 ANR 120 90/91 Modules: Configuration Words | 81 |
| 170 ANR 120 90/91 Modules: Output Words | 85 |

170 ANR 120 90/91 Modules: Input Words

Input Words

| Input Words | Function |
|---------------------------------------------|----------------------------------------------------|
| %IW \ p.2.c \ 0.0.11 | status word of the module |
| %IW \ p.2.c \ 0.0.0 | status of the eight discrete inputs |
| %IW \ p.2.c \ 0.0.1 | analog value of channel 1, terminal block 2 No. 10 |
| %IW \ p.2.c \ 0.0.2 | analog value of channel 2, terminal block 2 No. 11 |
| %IW \ p.2.c \ 0.0.3 | analog value of channel 3, terminal block 2 No. 12 |
| %IW \ p.2.c \ 0.0.4 | analog value of channel 4, terminal block 2 No. 14 |
| %IW \ p.2.c \ 0.0.5 | analog value of channel 5, terminal block 2 No. 15 |
| %IW \ p.2.c \ 0.0.6 | analog value of channel 6, terminal block 2 No. 16 |
| %IW \ p.2.c \ 0.0.7 at %IW \ p.2.c \ 0.0.10 | not used |

p = position of the processor in the rack (0 or 1)

c = Fipio connection point number

Description of Input Word 11

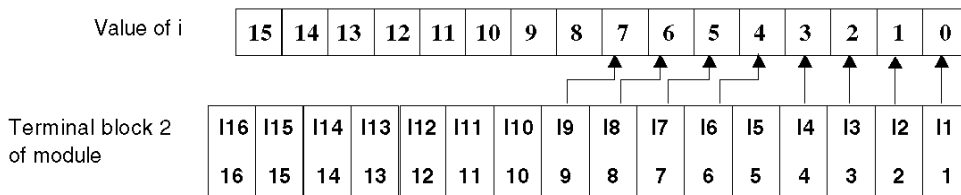
The status word contains information about module operation:

| Bits 15 to 9 | Bit 8 | Bits 7 to 4 | Bit 3 (Channels 7, 8) |
|--------------|--------------------------------------------------------------------|-------------|---------------------------|
| Not used | 0 = module not healthy (loss of module data) 1 = healthy module | Not used | 0 = fault 1 = no fault |

| Bit 2 (Channels 5, 6) | Bit 1 (Channels 4, 3) | Bit 0 (Channels 1, 2) |
|---------------------------|---------------------------|---------------------------|
| 0 = fault 1 = no fault | 0 = fault 1 = no fault | 0 = fault 1 = no fault |

Description of Input Word 0

This word contains a right justified binary eight bit data field for the 8 discrete inputs:
 $\%IW\backslash p.2.c\backslash 0.0.0:xi$



Description of Input Words 1 to 6

These words are assigned to the analog input register. Each word on this page contains a left justified, binary 15 bit data field. The range is from 0H to 7FFE hex, but the resolution is 14 bit (0 32766 decimal or 0 to 7 FFE hex).

Range

Analog output operating range:

| | Input Voltage | Data is Left Justified | Comment |
|------------------------------------|----------------------|--------------------------|--------------------------------------------------------------|
| Input Range 170 ANR 120 90 | 0 to 10.000 | 0 to 32000 | Nominal input voltage range |
| Input Range 170 ANR 120 91 | - 10.000 to + 10.000 | 00382 to 32382 | |
| Input Over Range 170 ANR 120 90 | 10.000 to 10.238 | 32002 to 32764 | Linear over range input voltage |
| Input Over Range 170 ANR 120 91 | +10.000 to +10.238 | 32384 to 32764 | |
| Input Out of Range | ≥ 10.238 | 32766 (7FFE Hexadecimal) | Input voltage exceeding the threshold may damage the module. |
| Input Under Range | -10.238 to -10.000 | 00002 to 00382 | Linear undervoltage range |
| Input Out of Range | ≤ -10.238 | 00000 | Input voltage exceeding the threshold may damage the module. |

170 ANR 120 90/91 Modules: Configuration Words

Register of Internal Words

Configuration of the modules is carried out on the internal words %MW \ p.2.c \ 0.0.20 to %MW \ p.2.c \ 0.0.26 as shown in the table below:

| Word | Function |
|----------------------|---------------------------------------------------|
| %MW \ p.2.c \ 0.0.20 | system information |
| %MW \ p.2.c \ 0.0.21 | configuration of discrete fallback values |
| %MW \ p.2.c \ 0.0.22 | configuration of analog fallback values |
| %MW \ p.2.c \ 0.0.23 | user defined analog fallback values for channel 1 |
| %MW \ p.2.c \ 0.0.24 | user defined analog fallback values for channel 2 |
| %MW \ p.2.c \ 0.0.25 | user defined analog fallback values for channel 3 |
| %MW \ p.2.c \ 0.0.26 | user defined analog fallback values for channel 4 |

p = position of the processor in the rack (0 or 1)

c = Fipio connection point number

Description of Word 20

NOTE: Caution: Zero is an illegal value for the system information register.

Entering a value of 0 in word 20 triggers output fallback. In this case; inputs and outputs are not updated.

| Word | Description |
|-----------|---------------------------------------------------------------------------------------------------|
| Bits 0 14 | Not used or that can be used to start the module (READY LED lit, if the value entered exceeds 0). |
| Bit 15 | 1 = validates use of fallback values. 0= no fallback value. |

- In word 20, the authorized value range is: 0001 to FFFF.
For proper operation of the module, it is mandatory to configure a value greater than 0 in the register.
- The register default value at power up is 0 (module stopped).

Description of Word 21

Configuration of discrete output fallback values:

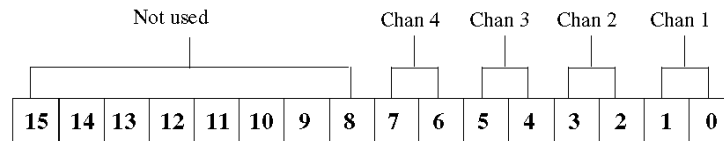
| Word | Description |
|-----------|------------------------------------------------|
| Bits 0 7 | fallback value for discrete outputs 1 to 8 |
| Bits 8 13 | not used |
| Bit 14 | 0 = hold last value, 1 = user-defined value |
| Bit 15 | 0 = reset outputs, 1 = check bit 14 |

Description of Word 22

Words 22 to 26 are used to define analog output fallback values.

2 bits per channel to configure fallback management:

| Word | Error Status |
|------|------------------------------------|
| 00 | minimum output voltage |
| 01 | hold last value (by default) |
| 10 | user defined shutdown value |
| 11 | hold last value (usually not used) |

**Descriptions of Words 22 to 26**

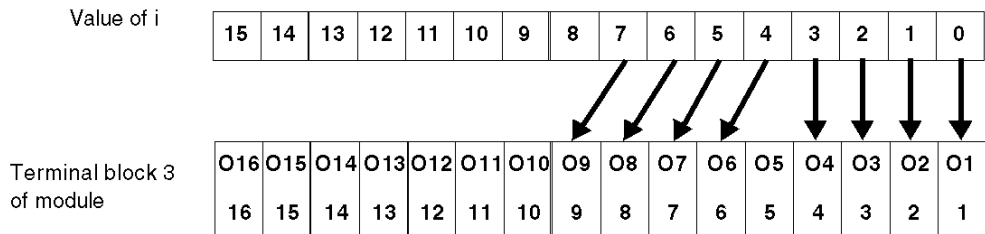
Used if the combination 10 is defined in word 22. They then contain the fallback value.

Output Words

The I/O registers assigned to this module are used for output data as follows:

| Word | Function |
|------------------|-----------------------------------------------------------|
| %QWp.2.c\0.0.0 | write to 8 discrete outputs |
| %QW\ p.2.c\0.0.1 | analog output word for channel 1, terminal block 3 No. 10 |
| %QW\ p.2.c\0.0.2 | analog output word for channel 2, terminal block 3 No. 12 |
| %QW\ p.2.c\0.0.3 | analog output word for channel 3, terminal block 3 No. 14 |
| %QW\ p.2.c\0.0.4 | analog output word for channel 4, terminal block 3 No. 16 |

%QWp.2.c\0.0.0:xi



Range

Analog output operating range:

| | Output Voltage | Data is Left Justified | Comment |
|-------------------------------------|-----------------------|-------------------------------|---------------------------------------------|
| Output Range 170 ANR 120 90 | 0 to 10.000 | 0 to 32000 | Nominal Output Voltage Range |
| Output Range 170 ANR 120 91 | - 10.000 to + 10.000 | 00382 to 32382 | |
| Output Over Range 170 ANR 120 90 | 10.000 to 10.238 | 32002 to 32764 | Linear Over Range Output Voltage |
| Output Over Range 170 ANR 120 91 | +10.000 to +10.238 | 32,384 to 32,764 | |
| Output Out of Range | ≥ 10.238 | 32766 (7FFE Hex) | Threshold Will Be Limited To 32.766 Decimal |
| Output Under Range. | -10.238 to -10.000 | 00002 to 00382 | Linear undervoltage range |
| Output Out of Range | ≤ -10.238 | 00000 | Threshold limited to 00000. |

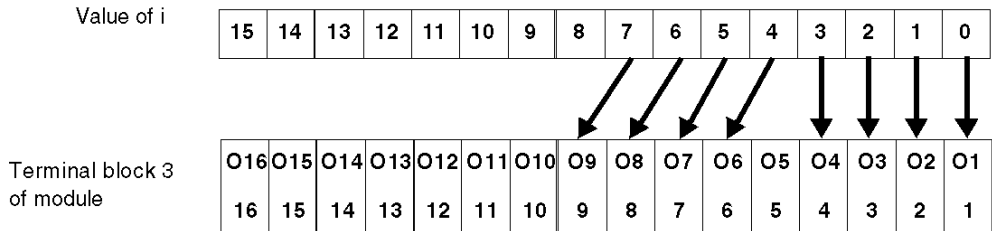
170 ANR 120 90/91 Modules: Output Words

Output Words

The I/O registers assigned to this module are used for output data as follows:

| Word | Function |
|------------------|-----------------------------------------------------------|
| %QWp.2.c\0.0.0 | write to 8 discrete outputs |
| %QW\ p.2.c\0.0.1 | analog output word for channel 1, terminal block 3 No. 10 |
| %QW\ p.2.c\0.0.2 | analog output word for channel 2, terminal block 3 No. 12 |
| %QW\ p.2.c\0.0.3 | analog output word for channel 3, terminal block 3 No. 14 |
| %QW\ p.2.c\0.0.4 | analog output word for channel 4, terminal block 3 No. 16 |

%QWp.2.c\0.0.0:xi



Range

Analog output operating range:

| | Output Voltage | Data is Left Justified | Comment |
|-------------------------------------|----------------------|------------------------|---------------------------------------------|
| Output Range 170 ANR 120 90 | 0 to 10.000 | 0 to 32000 | Nominal Output Voltage Range |
| Output Range 170 ANR 120 91 | - 10.000 to + 10.000 | 00382 to 32382 | |
| Output Over Range 170 ANR 120 90 | 10.000 to 10.238 | 32002 to 32764 | Linear Over Range Output Voltage |
| Output Over Range 170 ANR 120 91 | +10.000 to +10.238 | 32384 to 32764 | |
| Output Out of Range | ≥10,238 | 32766 (7FFE Hex) | Threshold Will Be Limited To 32.766 Decimal |
| Output Under Range. | -10,238 to -10,000 | 00002 to 00382 | Linear undervoltage range |
| Output Out of Range | ≤-10.238 | 00000 | Threshold limited to 00000. |

5.5 Addressing a Special Module: 170 AEC 920 00

Aim of this Section

This section provides information about the configuration of the 170 AEC 920 00 discrete inputs/outputs Momentum module on Fipio.

Full operation for the module is described in the base setup documentation (870 USE 002).

What's in this Section?

This section contains the following topics:

| Topic | Page |
|----------------------------------------|------|
| Example of module configuration in PL7 | 87 |
| Configuration of Counting Functions | 90 |
| 170 AEC 920 00 Module: Input Words | 94 |

Example of module configuration in PL7

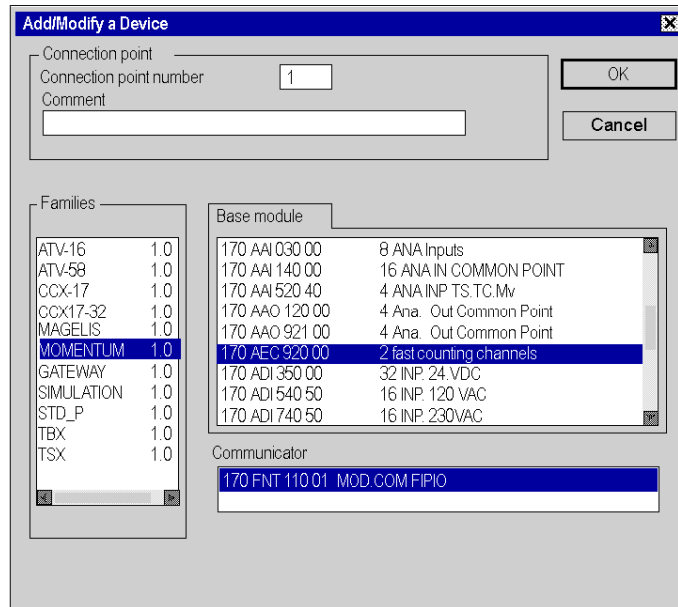
At a Glance

This module is a counting module with 2 independent high-frequency counters (10 kHz - 200 kHz).

The following example allows you to configure and program a Momentum 170 AEC 920 00 on FIPIO in PL7.

PL7 Configuration

- Open PL7.
- Create a new animation.
- Correctly configure the hardware (rack, power supply, processor).
- Double-click the processor's FIPIO icon.
- Add the TSX 170 AEC 920 00 Momentum module.



NOTE: If you have PL7 Pro < V4.0, module 170 AEC 920 00 will not be in the list, and you must choose the standard profile "OTHER FSD_P".

- Position the cursor on Adjust mode, and enter the counting function configuration parameters.

Illustration of the Momentum adjustment screen:

The screenshot shows a software interface for adjusting parameters. At the top, it displays '170 ANR 120 90 [FIPIO1 MODULE 0]'. Below this, there are dropdown menus for 'Adjust' and 'Designation: 6A4AO 0..10V,8DI 8DO 24V'. Further down, there are dropdowns for 'Channel 0' and 'Task: Mast'. A 'Parameters by default' button and a 'Base' dropdown set to 'Decimal' are also visible. The main part of the screen is a table with three columns: 'Parameter', 'Symbol', and 'Value'. The table lists parameters from %MW0.2.1V.0.4 to %MW0.2.1V.0.19, with their corresponding values in hexadecimal or decimal format.

| Parameter | Symbol | Value |
|----------------|--------|---------|
| %MW0.2.1V.0.4 | | 16#1203 |
| %MW0.2.1V.0.5 | | 16#1203 |
| %MW0.2.1V.0.6 | | 16#81 |
| %MW0.2.1V.0.7 | | 16#81 |
| %MW0.2.1V.0.8 | | 1000 |
| %MW0.2.1V.0.9 | | 0 |
| %MW0.2.1V.0.10 | | 1000 |
| %MW0.2.1V.0.11 | | 0 |
| %MW0.2.1V.0.12 | | 0 |
| %MW0.2.1V.0.13 | | 0 |
| %MW0.2.1V.0.14 | | 0 |
| %MW0.2.1V.0.15 | | 0 |
| %MW0.2.1V.0.16 | | 0 |
| %MW0.2.1V.0.17 | | 0 |
| %MW0.2.1V.0.18 | | 0 |
| %MW0.2.1V.0.19 | | 0 |

Example of Counting Function Configuration

- In the parameter words %MW\p.2.c\0.0.4 and %MW\p.2.c\0.0.5 (see page 90), enter the hex value **16#1203**.
Information:
Bit 0 - enable preset = 1 (otherwise, the preset value is inactive)
Bit 1 - enable software = 1 (otherwise the module is non operational)
Bit 9 = 1
Bit 8, 10, 11 = 0, choice of operating mode: positive counter
Bit 12 = 1
Bit 13, 14 = 0, preset on rising edge of discrete inputs I1 and I4
- In the parameter words %MW\p.2.c\0.0.6 and %MW\p.2.c\0.0.7 (see page 90), enter the hex value **16#81**.
Information:
Bit 0 = 1
Bit 1, 2, 3 = 0, identity code for a preset value
Bit 7 = 1, broken sensor monitoring activation bit

- In the parameter words %MW\p.2.c\0.0.8, %MW\p.2.c\0.0.9, %MW\p.2.c\0.0.10 and %MW\p.2.c\0.0.11 (see page 90): preset value.

Minimum hardware setup required:

- 24 V on connectors 1 and 2
- Encoder supply on connector 3
- Encoders connected
- Actuators on discrete inputs 2 and 5 for external enabling of the counters (otherwise counting is blocked)
- Actuators on discrete inputs 1 and 4 for enabling preset values

Programming to take new preset into account:

Setting inputs 2 and 5 to 1 should allow you to see the counting progress in the input words %IW\0.2.1\0.0.4 to %IW\0.2.1\0.0.7.

During operation, preset values must be written in the output words %QW\0.2.1\0.0.0 to %QW\0.2.1\0.0.3, which are the images of output words 5 and 6 for counter 1,6 and 7 and for counter 2.

Counter 1 preset example:

```
(* preset value in %MW0 *)
IF %M1 THEN %QW\0.2.1\0.0.0 := %MW0;
(* write 0 on bits 0 and 1 output word 0 *)
    %MW\0.2.1\0.0.4:= 16#1200 ;
    WRITE_PARAM %CH\0.2.1\0.0 ;
    SET %M2 ;
    RESET %M1 ;
END_IF ;
(* Write at 1 for the software enable bit and the preset bit *)
IF %M2 THEN %MW\0.2.1\0.0.4:=16#1203;
    WRITE_PARAM %CH\0.2.1\0.0;
    RESET %M2 ;
END_IF ;
```

Configuration of Counting Functions

Description

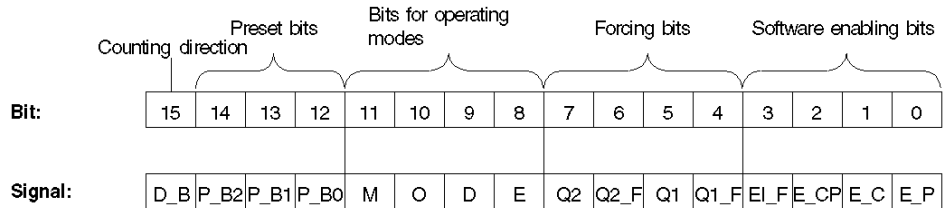
Eight output words are available for configuring the two module counters for the 170 AEC 920 00 module.

| Output Words | Function | PLC Designation |
|--------------|------------------------------------------------|------------------|
| Word 1 | Configuration bit for counter 1 | %MW\p.2.c\0.0.4 |
| Word 2 | Configuration bit for counter 2 | %MW\p.2.c\0.0.5 |
| Word 3 | Counter 1 output / setpoint data configuration | %MW\p.2.c\0.0.6 |
| Word 4 | Counter 2 output / setpoint data configuration | %MW\p.2.c\0.0.7 |
| Word 5 | Counter 1 setpoint data (Low) | %MW\p.2.c\0.0.8 |
| Word 6 | Counter 1 setpoint data (High) | %MW\p.2.c\0.0.9 |
| Word 7 | Counter 2 setpoint data (Low) | %MW\p.2.c\0.0.10 |
| Word 8 | Counter 2 setpoint data (High) | %MW\p.2.c\0.0.11 |

p = position of the processor in the rack (0 or 1), c: Fipio connection point number

Configuration Words 1 and 2

Illustration: %MW\p.2.c\0.0.4 and %MW\p.2.c\0.0.5



Meanings of signals:

| Signal | Meaning |
|--------|-------------------------------------------------------------------------------------------------------|
| D_B | If bit 15 is placed by the software, the directions of the count are reversed in all operating modes. |
| P_B2 | 3 bits for selecting the preset mode |
| P_B1 | |
| P_B0 | |
| M | 4 bits for selecting the operating modes |
| O | |
| D | |
| E | |
| Q2 | Saving the valency for the Q2 digital output (forcing after 0 or 1) |
| Q2_F | Activate forcing for Q2 digital output (1 = activated) |
| Q1 | Saving the valency for the Q1 digital output (forcing after 0 or 1) |
| Q1_F | Activate forcing for Q1 digital output (1 = activated) |
| EI_F | Enable input filter 0 = without filter (<= 200 kHz); 1 = with filter (<= 20 kHz) |
| E_CP | Software enable for Freeze the value of counter 1 |
| E_C | Software enable for counters |
| E_P | Enable for Reset to the preset value |

For SSI transmitters, the preset value and the software limit-switch values must be transmitted again after reversing the counting direction.

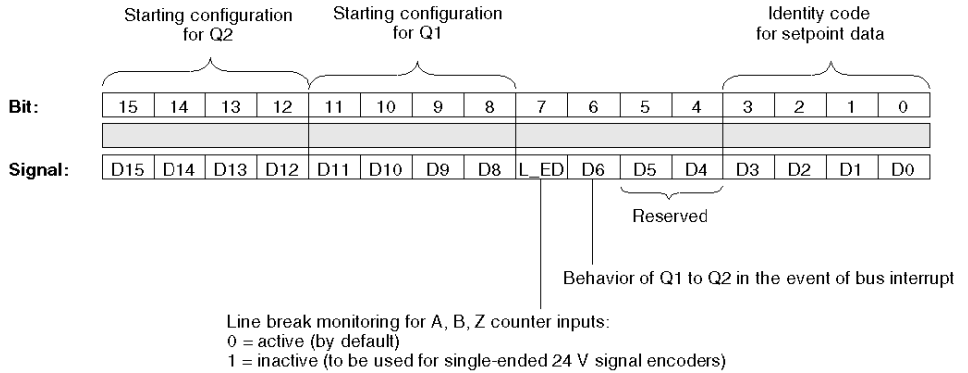
With output 2, the same functions are defined for counter 2 (however, for digital outputs, Q3 instead of Q1, and Q4 instead of Q2).

Configuration Word 3

Output word 3 allows the following functions for counter 1 to be defined:

- The meaning of parameters, which will be transmitted in words 5 and 6, is determined using the identity code for setpoint values (D0 ... D3).
- D4 and D5 reserved.
- D6, D7 module behavior in the event of bus interrupt and counter input line break.
- Starting configuration of the Q1 digital output (D8 ...D11).
- Starting configuration of the Q2 digital output (D12 ...) D15).

Illustration: %MW\p.2.c\0.0.6

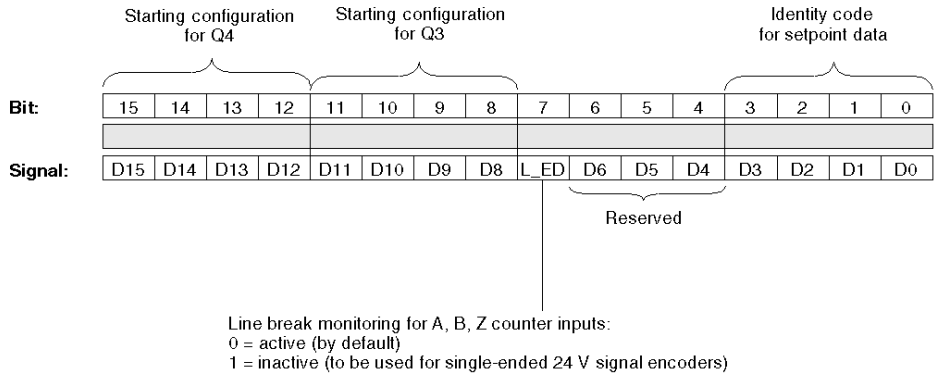


Configuration Word 4

Output word 4 allows the following functions for counter 2 to be defined:

- The meaning of parameters, which will be transmitted in words 7 and 8, is determined using the identity code for setpoint values (D0 ... D3).
- D4, D5 and D6 are reserved.
- D7 behavior of counter 2 in the event of break in the bus or counter input lines.
- Starting configuration of the Q3 digital output (D8 ... D11).
- Starting configuration of the Q4 digital output (D12 ... D15).

Illustration: %MW\p.2.c\0.0.7



Configuration Word 5/6 and 7/8

In the output words 5 and 6, the setpoint values are transmitted as 32-bit values for counter 1, in accordance with the identity code defined in words 3 and 4 (counter 1: %MW\p.2.c\0.0.8 and %MW\p.2.c\0.0.9, counter 2: %MW\p.2.c\0.0.10 and %MW\p.2.c\0.0.11):

| Identity Code | Function |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hex: 0 | No setpoint value selected. |
| Hex: 1 | Prefix value (24 bits + sign) or SSI Offset value (maximum transmitter resolution) |
| Hex: 2 | Threshold value 1 (24 bits + sign for the incremental transmitter; 25 bits for the absolute transmitter) |
| Hex: 3 | Threshold value 2 (24 bits + sign for the incremental transmitter; 25 bits for the absolute transmitter) |
| Hex: 4 | Counter 1 software limit switch overrun (24 bits + sign for the incremental transmitter; 25 bits for the absolute transmitter) |
| Hex: 5 | Counter 2 software limit switch underrun (24 bits + sign for the incremental transmitter; 25 bits for the absolute transmitter) |
| Hex: 6 | Pulse width (in ms) for Q1/Q2 digital outputs (1 .. 2 EXP 32) |
| Hex: 7 | Modulo value for the event counter (repeating counter); the function can be deactivated using the modulo value= 0 (24 bits max.) |
| Hex: 8 | Time base for the "Period counter" operating mode (Operating mode 9) 0 = without time base: complete period: 1 = 1 , 2 = 10, 3 = 100, 4 = 1,000, 5 = 10,000 (in microseconds); half-period: 9 = 1 , A = 10 , B = 100 , C = 1,000 , D = 10,000 [microseconds] For transmission of all other values, the P_E bit s established and the 1F identity code is recalled. |
| Hex: 9 | Time base for the "Frequency counter" operating mode (Operating mode A) 0 = without time base: complete period 1 = 0.1 , 2 = 1, 3 = 10, 4 = 100, 5 = 1,000 (in ms); half-period: 9 = 0.1, A = 1, B = 10, C = 100, D = 1 000 (in ms) For transmission of all other values, the P_E bit s established and the 1F identity code is recalled. |
| Hex: A | Selection of a complete period/half-period for time base pulse transmitter (Operating mode 8) (0 = not valid, PE-Bit is placed 1 = complete period, 2 = half-period at each Bx counting input) |
| Hex: B | Time base in ms for the frequencies output (1 .. 2 EXP 32) only for pulses on Q1/3 digital outputs (only for half periods) |
| Hex: C | reserved |
| Hex: D until hex: F | reserved values (correspond to identity code 0) |

170 AEC 920 00 Module: Input Words

The 8 Input Words

8 input words are available for configuring the two module counters for the 170 AEC 920 00 module.

View of input word functions:

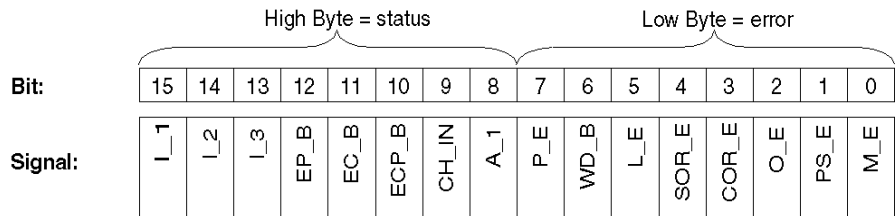
| Output Words | Function | PLC Designation |
|--------------|-------------------------------------------------------|-----------------|
| Word 1 | Status and error bit for counter 1 | %IW\p.2.c\0.0.0 |
| Word 2 | Status and error bit for counter 2 | %IW\p.2.c\0.0.1 |
| Word 3 | Counter 1 output configuration / setpoint data report | %IW\p.2.c\0.0.2 |
| Word 4 | Counter 2 output configuration / setpoint data report | %IW\p.2.c\0.0.3 |
| Word 5 | Count value (Low) of counter 1 | %IW\p.2.c\0.0.4 |
| Word 6 | Count value (High) of counter 1 | %IW\p.2.c\0.0.5 |
| Word 7 | Count value (Low) of counter 2 | %IW\p.2.c\0.0.6 |
| Word 8 | Count value (High) of counter 2 | %IW\p.2.c\0.0.7 |

p: position of the processor in the rack (0 or 1), c: Fipio connection point number.

Input Words 1 and 2

The counter uses the status bits to transmit error messages as well as the hardware input states and the corresponding software enabling bits.

Illustration: %IW\p.2.c\0.0.0 and %IW\p.2.c\0.0.1:



Meanings of signals:

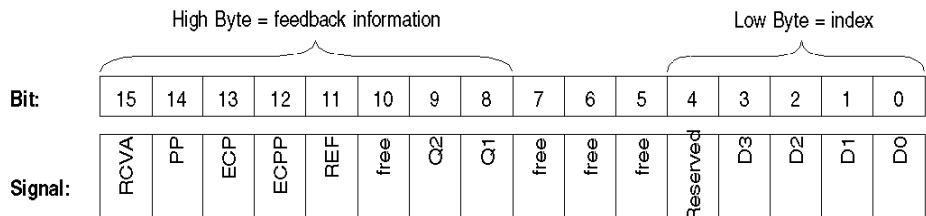
| Signal | Meaning |
|--------|---------------------------------------------------|
| I_1 | Value of discrete input I1. |
| I_2 | Value of discrete input I2. |
| I_3 | Value of discrete input I3. |
| EP_B | Software enable of Reset to the preset value. |
| EC_B | Software enable of counter 1. |
| ECP_B | Software enable of Freeze the value of counter 1. |
| CH_IN | Initialization of counter 1 is complete. |
| A_1 | A1 counter input valency. |
| P_E | Configuration error. |
| WD_B | Time check error on absolute encoder. |
| L_E | Counter input line break. |
| SOR_E | Software limit switch overrun. |
| COR_E | Counter overrun. |
| O_E | Short circuit or overload for outputs Q1, Q2. |
| PS_E | Power supply missing (outputs, transmitter). |
| M_E | The module has not been configured. |

Input Words 3 and 4

In input words 3 and 4, the feedback on indices and the counter bit parameter states are transmitted to the API.

Input word 3 allows feedback to be transmitted for counter 1.

Illustration: %IWp.2.c0.0.2 and %IWp.2.c0.0.3:



Meanings of signals

| Signal | Meaning |
|----------|--------------------------------------------------------------|
| RCVA | 1. The counting cycle is finished. |
| PP | Preset value accepted. |
| ECP | The counter is enabled. |
| ECPP | The counting value is frozen. |
| REF | The preset value has been accepted for operating modes 4, 5. |
| free | free |
| Q2 | Value of discrete output Q2. |
| Q1 | Value of discrete output Q1. |
| free | free |
| free | free |
| free | free |
| Reserved | Reserved |
| D3 | Feedback signal for indices transmitted (Handshake). |
| D2 | |
| D1 | |
| D0 | |

Input Words 5, 6 and 7, 8

Input words 5 and 6 (for counter 1) or 7 and 8 (for counter 2) contain the current values (actual data) of the encoder. In order to do this, two words (1 double word) are available for each counter.

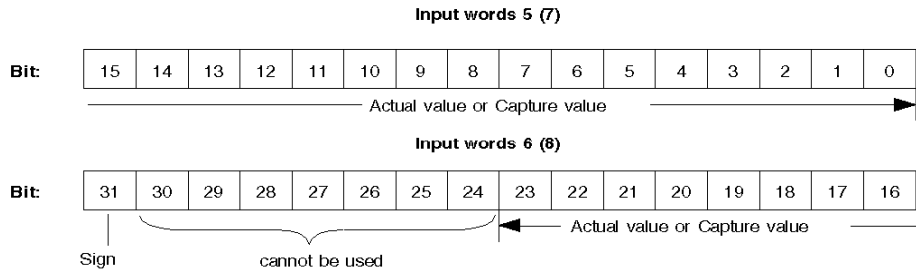
NOTE: The input words 5/6 or 7/8 transmit only the counters' actual values. Rereading of previously transmitted setpoint values is not possible.

Current Values for the Incremental Encoder

Resolution with/without sign:

- The respective resolution of the actual values is 24 bits plus sign (-16 777 216 to +16 777 215).
- If a modulo value has been predefined, the maximum resolution is 24 bits without sign (0 to +16 777 215).

Representation of the actual value:

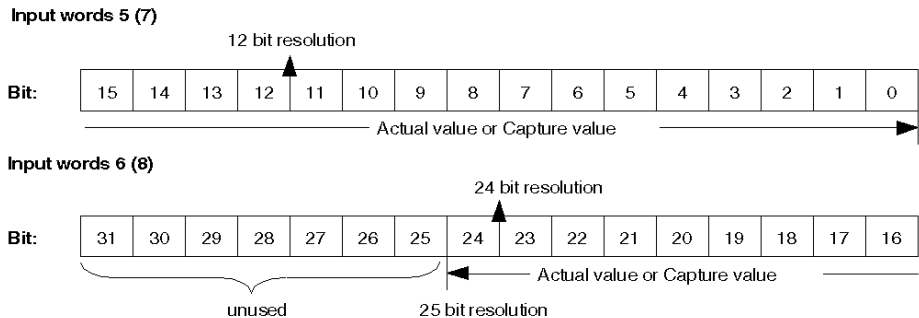


Current Values for the Absolute Encoder

For absolute encoders, feedback signaling of current values is permanent. The resolution is:

- 25 bits without sign, that is, from 0 to 33 554 431, for 25 pulses
- 24 bits without sign, that is, from 0 to 16 777 215, for 24 pulses
- 12 bits without sign, that is, from 0 to 4 095, for 12 pulses

Representation of the input word for 12, 24 and 25 bits:



Diagnostics for Momentum Modules

6

Aim of this Chapter

This chapter details the default Momentum behavior, when used on a Fipio bus controlled by a Premium PLC.

What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
|---------------------------------------------|------|
| Fault Behavior of Simple Momentum Modules | 100 |
| Fault Behavior of Advanced Momentum Modules | 103 |

Fault Behavior of Simple Momentum Modules

General

The list of simple Momentum modules is given in Chapter 1 (*see page 14*) of this manual.

Detectable Faults

List of all faults that can be detected by the PLC Premium+Fipio Bus+Simple Momentum Module set:

- Momentum module missing or inoperative
- Momentum module present, but different to the one declared at configuration
- Communication on Fipio bus interrupted
- Peripheral type fault

Peripheral Type Faults

List of "Peripheral" type faults in simple Momentum modules:

- Short-circuit of one or several discrete outputs
- Open circuit on one or several discrete outputs
- Output supply fault
- One or several terminal blocks missing on a Momentum base

Input and Output Values

The inputs and outputs of a simple Momentum module (*see Addressing I/O Discrete Momentum Standard Modules, page 38*) take different values depending on the nature of the fault encountered.

Input values and output states with faults:

| Fault | Input Value | Output State |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module missing or inoperative | All module inputs are at zero | No value has been applied |
| Module different from the one configured | All module inputs are at zero | No value has been applied |
| (2) For the PL7 versions \leq V3.4C, ALL inputs are set to zero. (3) The behavior of faulty outputs depends on the type of Momentum base used. Only those connection bases with the capacity to signal errors on their outputs are able to manage the fallback to zero. Refer to Modicon Momentum I/O Bases User Guide (870 USE 002). | | |
| Fipio comm. interrupted | All module inputs are at zero | No value has been applied |
| Peripheral | <ul style="list-style-type: none"> The faulty channel(s) is at zero (2) The valid channels take the sensor value | <ul style="list-style-type: none"> The faulty channels fallback to zero or are maintained in their last valid state (3) The values continue to be applied to the valid channels. |

Module Diagnostics

Momentum modules have an error bit and a status word that can be visualized using the PL7 software diagnostics screen.

Table of values and error messages:

| Type of Fault | Error Bit Module %I\p.2.c\0.MOD.ERR | Word Status Fault Module %MW\p.2p.c\0.MOD.2 | Message on PL7 Diagnostic Module Screen |
|--------------------------------------------------|------------------------------------------------|--------------------------------------------------------|--------------------------------------------------------|
| Module Missing or Inoperative | 1 | Bit 6 = 1 | Module missing or inoperative |
| Module present different from the one configured | 1 | Bit 5 = 1 | Different hardware and software configurations |
| Comm. FIPIO interrupted | 1 | Bit 6 = 1 | Module missing or inoperative |
| Peripheral | 1 | Bit 1 = 1 | Faulty channel(s) |

Channel Diagnostics

Momentum module channels have an error bit and a status word that can be visualized using the PL7 software diagnostics screen.

Table of values and error messages:

| Type of Fault | Error Bits Channel %I\p.2.c\0.i.ERR | Word Status Fault Channel %MW\p.2p.c\0.0.2 | Message on PL7 Channel Diagnostic Screen |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------------------|------------------------------------------------|
| Module Missing or Inoperative | All at 1 | Bit 6 = 1 | Channel(s) inoperative |
| Module present different from the one configured | All at 1 | Bit 5 = 1 | No message displayed |
| Comm. FIPIO interrupted | All at 1 | Bit 6 = 1 | Communication |
| Peripheral | Zero (1) | Bit 1 = Zero (2) | Diagnostics screen inaccessible (3) |
| <p>(1) PL7 cannot determine which channel is faulty. For PL7 versions \leq V3.4C, the error bits for all channels of the module are set to 1.</p> <p>(2) PL7 cannot determine which channel is faulty. For the PL7 versions \leq V3.4C, the 1 bit of the status word is equal to 1.</p> <p>(3) For the PL7 versions \leq V3.4C, the screen can be accessed and displays "change input fuse."</p> | | | |

Fault Behavior of Advanced Momentum Modules

General

The list of advanced Momentum modules is given in Chapter 1 (*see page 14*) of this manual.

Detectable Faults

List of all faults that can be detected by the PLC Premium+Fipio Bus+Advanced Momentum Module set:

- Momentum module missing or inoperative
- Momentum module present, but different to the one declared at configuration
- Communication on Fipio bus interrupted
- Invalid adjustment parameter(s) ("WRITE_PARAM" PL7 instruction or Fipio adjustment screen on pg17)
- Peripheral type fault

Peripheral Type Faults

List of Peripheral type faults in advanced Momentum modules:

- Short-circuit of one or several discrete outputs
- Open circuit on one or several discrete outputs
- Output supply fault
- Out of range analog value

Input and Output Values

The inputs and outputs of an advanced Momentum module (*see Addressing Advanced Momentum Modules, page 61*) take different values depending on the nature of the fault encountered.

Input values and output states with faults:

| Fault | Input Value | Output State |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Module missing or inoperative | All module inputs have the last valid value entered. | Feedback force according to parameters implemented |
| Module different from the one configured | All module inputs have the last valid value entered. | Fallback forced according to parametering done |
| Fipio comm. interrupted | All module inputs have the last valid value entered. | Fallback forced according to parametering done |
| <p>(2) This error code depends on the base's capacity to indicate faults on the peripherals. (3) The behavior of faulty outputs depends on the type of Momentum base used. Only those bases with the capacity to signal errors on their outputs are able to manage the fallback to zero (refer to <i>Addressing Advanced Momentum Modules, page 61</i>).</p> | | |
| Parameter(s) of invalid adjustment | Error code sent by the Momentum base. Always different from all possible normal input values. Non-faulty channels continue to work. (2) | <ul style="list-style-type: none"> The faulty channels fallback to zero or are maintained in their last valid state (3) The values continue to be applied to the valid channels. |
| "Peripheral" | Error code sent by the Momentum base. Always different from all possible normal input values. Non-faulty channels continue to work. (2) | <ul style="list-style-type: none"> The faulty channels fallback to zero or are maintained in their last valid state (3) The values continue to be applied to the valid channels. |

Module Diagnostics

Momentum modules have an error bit and a status word that can be visualized using the PL7 software diagnostics screen.

Table of values and error messages:

| Type of Fault | Error Bit Module %Ip.2.c\0.MOD.ERR | Word Status Fault Module %MWp.2p.c\0.MOD.2 | Message on PL7 Diagnostic Module Screen |
|--------------------------------------------------|---------------------------------------|-----------------------------------------------|------------------------------------------------|
| Module Missing or Inoperative | 1 | Bit 6 = 1 | Module missing or inoperative |
| Module present different from the one configured | 1 | Bit 5 = 1 | Different hardware and software configurations |
| Comm. Fipio interrupted | 1 | Bit 6 = 1 | Module missing or inoperative |
| Invalid adjustment parameter(s) | 0 | 0 | No message displayed |
| Peripheral | 0 | 0 | No message displayed |

Channel Diagnostics

Momentum module channels have an error bit and a status word that can be visualized using the PL7 software diagnostics screen.

Table of values and error messages:

| Type of Fault | Error Bits Channel %I\p.2.c\0.i.ERR | Word Status Fault Channel %MW\p.2p.c\0.0.2 | Message on PL7 Channel Diagnostic Screen |
|--------------------------------------------------|----------------------------------------|-----------------------------------------------|---------------------------------------------|
| Module Missing or Inoperative | All at 1 | Bit 6 = 1 | Channel(s) inoperative |
| Module present different from the one configured | All at 1 | Bit 5 = 1 | No message displayed |
| Comm. Fipio interrupted | All at 1 | Bit 6 = 1 | Communication |
| Invalid adjustment parameter(s) | 0 | 0 | Diagnostics screen inaccessible |
| Peripheral | 0 | 0 | Diagnostics screen inaccessible |

Appendices



IV

Implementing on Another Fip Bus



Aim of this Chapter

This chapter presents the information necessary for implementing the communicator on a Fip bus, other than Fipio.

What's in this Chapter?

This chapter contains the following topics:

| Topic | Page |
|------------------------------------------|------|
| Standard Fipio Profiles | 110 |
| Information Specific to Momentum Modules | 111 |

Standard Fipio Profiles

General

The **170 FNT 110 01** Fipio Momentum communicator conforms to one of the 3 standard Fipio profiles described in the **FCP DM FSDP V10E** documentation, in either class 1 or 2.

The following table details the profile adopted by the communicator according to the base selected:

| | Base Examples | Profile | Class |
|-----------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------------|
| Number of ≤ 2 input words and Number of ≤ 2 output words | 170 ADI 350 00 170 ADI 340 00 170 ADO 350 00 170 ADO 340 00 170 ADM 350 10 170 ADM 690 50 170 ADM 390 30 170 ADM 370 10 | FRD | 1 |
| $2 < \text{Number of input words} \leq 8$ and $2 < \text{Number of output words} \leq 8$ | 170 AAI 030 00* 170 AAI 520 40* 170 AAO 120 00* 70 AAO 921 00* 170 AMM 090 00* | FSD | 2 |
| $8 < \text{Number of input words} \leq 32$ and $8 < \text{Number of output words} \leq 32$ | 170 AAI 140 00* | FED | 2 |

If the base does not have parameters, the communicator conforms to class 1.

If the base has parameters, the communicator conforms to class 2.

All Momentum modules are modular.

To understand the characteristics of the associated Fip variables and information on managing operating modes and diagnostics, refer to the **FCP DM FSDP V10E** standard profile documentation.

Information Specific to Momentum Modules

General

Certain information specific to the Momentum modules is necessary to complete the Fip variables. That is the subject of this paragraph.

Identification Variable

Since the Momentums are modular, their Identification variable has the format described in the standard profiles documentation for modular devices.

Values to be completed for the Momentum modules:

| Field | Value |
|---------------------------------------|-------------------------|
| Number of bytes contained | 4Fh |
| Manufacturer's Name | "MODICON" |
| Model Name | "MOMENTUM" |
| Product Version | 10h (for 1.0) |
| Communication class | 00h (no XWAY messaging) |
| Base module, "version" field | 10h (for 1.0) |
| Communication module, "version" field | 10h (for 1.0) |

Fields: **Catalogue Reference** and **ASCII Description**

NOTE: Contrary to the description in the Fipio standard profiles documentation, the "Catalogue Reference" field is not FFh for the Momentums. This field's value depends on the base onto which the communicator is connected to.

Values for basic Momentum modules:

| ASCII Description | Catalogue Reference |
|-------------------|---------------------|
| 170ADI35000 | 01h |
| 170ADI34000 | 02h |
| 170ADO35000 | 05h |
| 170ADO34000 | 06h |
| 170ADM35010 | 08h |
| 170ADM69050 | 09h |
| 170ADM39030 | 0Ah |
| 170ADM37010 | 0Bh |
| 170AAI03000 | C0h |
| 170AAI14000 | C1h |
| 170AAI52040 | C2h |
| 170AAO12000 | C3h |
| 170AAO92100 | C4h |
| 170AAM09000 | E0h |

Value for the Fipio communicator:

| ASCII Description | Catalogue reference |
|-------------------|---------------------|
| 170FNT11001 | 04h |

Presence Variable

Values to be completed for the Momentum modules:

| Field | Value |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| Length of identification variable | 4Fh |
| BA Arbitrator function status | Since Momentum does not support the arbiter function of the bus, the significant 4 bit byte of this byte is therefore equal to 0. |

Variable Report

The Momentums manage the counters 01h, 02h, 05h, 2Bh, 2Ch, 2Fh, 2Eh, 2Dh, 35h, 21h, 22h, 23h, 24h, 30h, 80h. The fields are in this order in the variable.

Value to be completed for the Momentum modules:

| Field | Value |
|--------------------------|-------|
| Number of byte contained | 30h |

LN_Uploading Variable

The Momentum promptness timer is equal to 256 ms.

Value to be completed for the Momentum modules:

| Field | Value |
|----------------------------------------|-------|
| Asynchronous promptness time out value | 30h |

FB_Configuration Variable

Configuration parameters

Class 2 Momentums do not manage the configuration data. Consequently the values of these words are ignored by class 2 Momentums.

In order to respect the control principle of the acceptance of the parameters sent by the FB_Configuration_Description variable, the bus manager should always put a zero value in these words because the FB_Configuration_Description variable is produced with parameter values with zero configuration.

Adjustment parameters

The class 2 Momentums manage the adjustment parameters. The values of adjustment parameters for each type of base are described in chapter 6 (see *Addressing Advanced Momentum Modules, page 61*).

The first word described corresponds to the word PRM0 of the FB_Configuration variable. Remember that these words are encoded according to Intel format (least significant first).

For example:

For the **170 AAI 030 00** communicator (8 analog inputs), the correspondence is as follows:

| | |
|------|-----------------|
| PRM0 | %MW\p.2.c\0.0.4 |
| PRM1 | %MW\p.2.c\0.0.5 |

FB_Configuration_Description Variable

The class 2 Momentums start with a configuration in the EMPTY state. They must therefore be sent the valid values via the FB_Configuration variable before sending the START command via the FB_Control variable.

FB_Control Variable

Specific commands

Momentum conforming to the FED profile do not manage specific commands. Any received values will be ignored.

FB_Status variable

Standard status

Description of Standard status field bits for Momentums:

| Bit | Description | Comments |
|-----|-----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 0 | Serious but temporary fault, internal to base | When this bit is set, transitional disturbance affects the behavior of the base connected to the communicator (EMC disturbance for example). When this fault disappears, the device resumes normal operation. |
| 1 | Minor fault, external to the base | When this bit is set, an external fault is present on the base used. The nature of this fault depends on the base itself. It is therefore useful to refer to the documentation for the base in question to know what type of external fault can be indicated in the application program by the I/O-Error signal for this type of base (short-circuit, etc.). |
| 2 | Not used | - |
| 3 | Not used | - |
| 4 | Internal module fault (breakdown) | - |
| 5 | Hardware configuration fault | - |
| 6 | Problem communicating with the PLC | - |
| 7 | Application fault (adjustment values refused) | - |

Specific status

Momentums conforming to the FED profile do not manage status commands: the corresponding words are always zero.

Application_Process_Control variable**Value of outputs**

This variable contains information described in chapter 6 (see *Addressing Momentum Modules, page 33*) for the %QW\p.2.c\0.0.0 and subsequent words in the case of the FSD and FED profiles or %Q\p.2.c\0.0 and subsequent words in the case of the FRD profile.

Remember that the words are encoded according to Intel format (least significant first). For bits, the bit position is described in the standard profile documentation. For example, the first 8 output bits of a discrete module are located in the first byte in the following order:

| | | | | | | | | |
|------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | %Q\p.2.c\0.7 | %Q\p.2.c\0.6 | %Q\p.2.c\0.5 | %Q\p.2.c\0.4 | %Q\p.2.c\0.3 | %Q\p.2.c\0.2 | %Q\p.2.c\0.1 | %Q\p.2.c\0.0 |
| MSB | b7 | b6 | b5 | b4 | b3 | b2 | b1 | b0 |

Application_Process_Status variable**Channel fault**

The input values are only valid if this byte is zero.

Other possible values are:

Meaning

| Value | Meaning |
|-------|---------------------------------------------------------------------------------------------------|
| FFh | The device is not configured (for a class 2 MOMENTUM) |
| 01h | A minor external fault is present on the base (cf. FB_Status variable, Standard Status field) |
| 02h | A serious temporary fault is present on the base. (cf. FB_Status variable, standard status field) |

Value of inputs

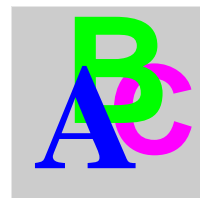
This variable contains information described in chapter 6 (see *Addressing Momentum Modules, page 33*) for the %IW\p.2.c\0.0.0 and subsequent words in the case of the FSD and FED profiles or %\p.2.c\0.0.0 and subsequent words in the case of the FRD profile.

Remember that the words are encoded according to Intel format (least significant first). For bits, the bit position is described in the Ref standard profile documentation. **FCP DM FSDP V10E**. See the paragraph relating to the Application_Process_Control variable for an example.

FB_adjustment variable

See the FB_Configuration variable.

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