azbil

OM2-5900-1110

Multi I/P Converter

Model KUX111

User's Manual

Azbil Corporation

NOTICE

While the information in this manual is presented in good faith and believed to be accurate, Azbil Corporation disclaims any implied warranty of merchantability or fitness for a particular purpose and makes no express warranty except as may be stated in its written agreement with and for its customer.

In no event shall Azbil Corporation be liable to anyone for any indirect, special or consequential damages. This information and specifications in this document are subject to change without notice.

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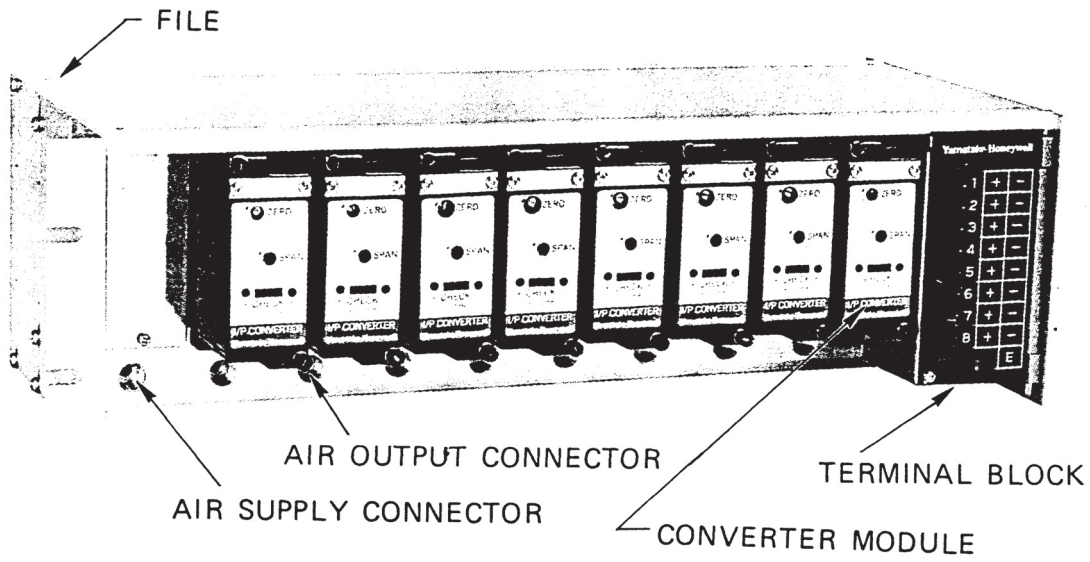


Fig. 1. External View of KUX111

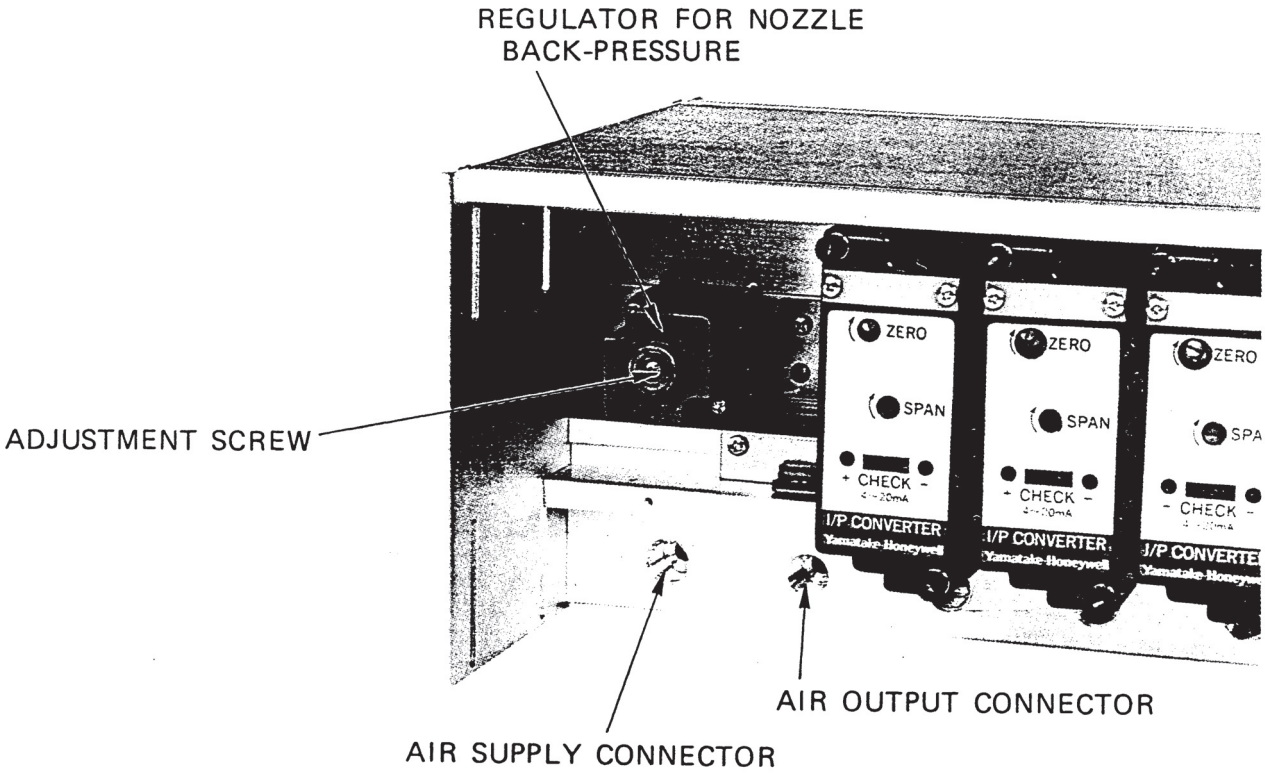


Fig. 2. Regulator for Nozzle Back-pressure

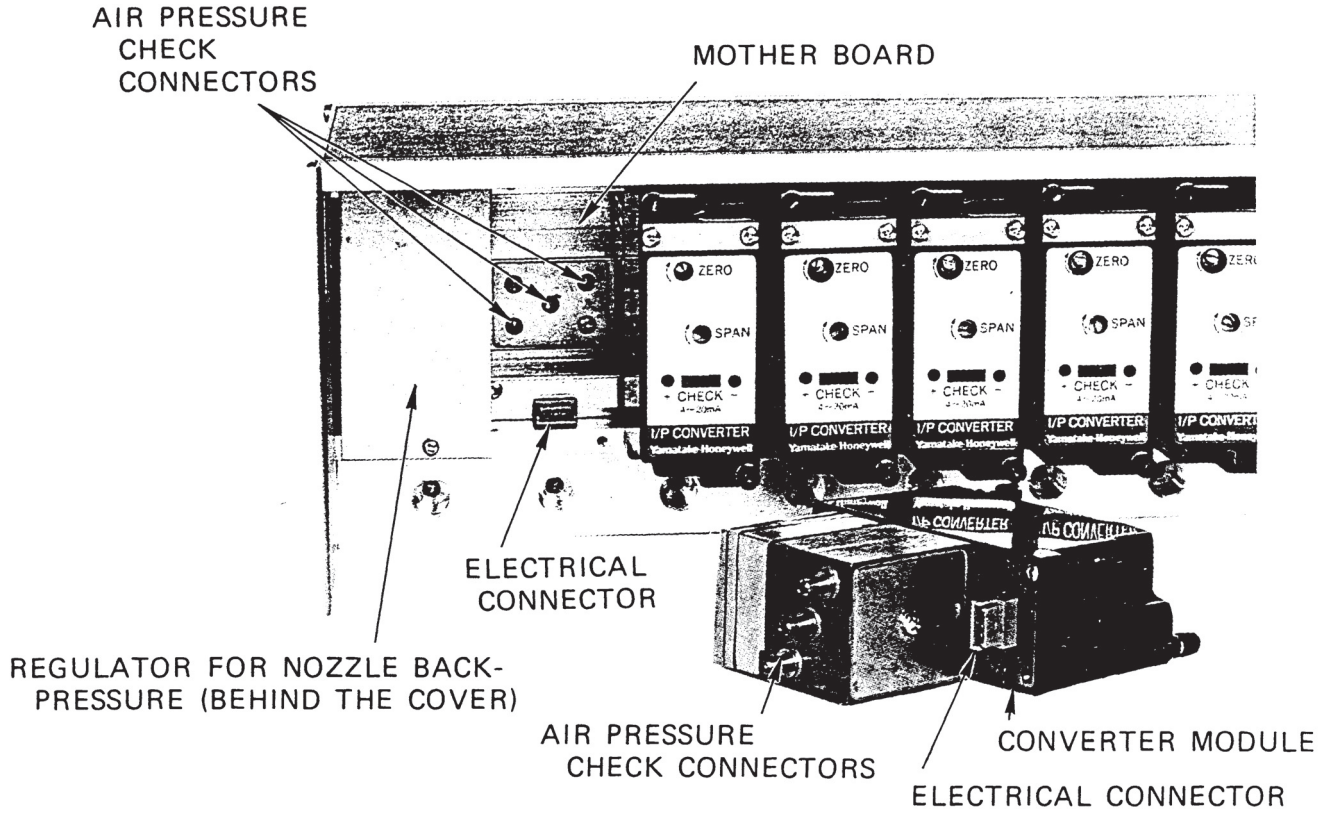


Fig. 3. KUX111 (With a Module Removed)

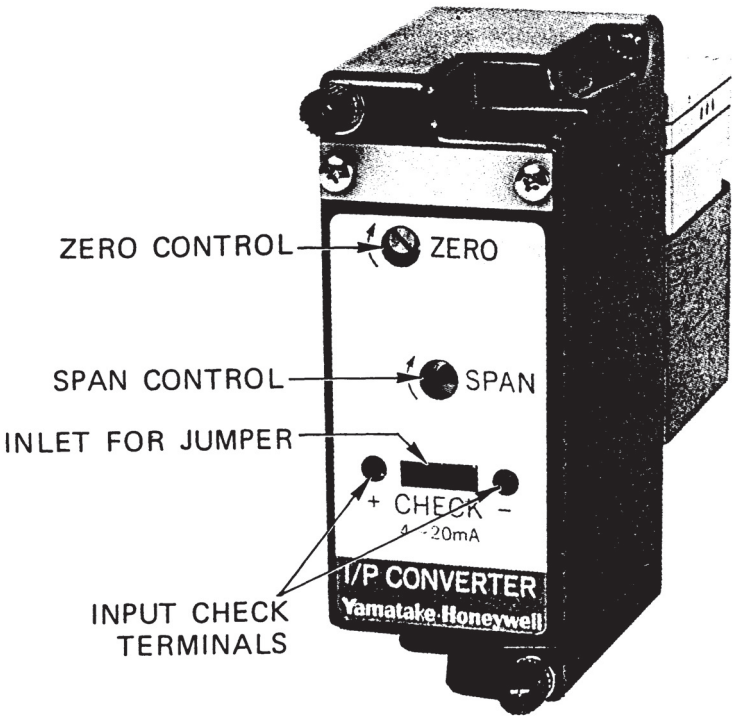


Fig. 4. I/P Converter Module (Model KUX118)

1. GENERAL

1.1 Description

Model KUXlll SystempaK Multiple I/P Converters are comprised of a file an I/P converter modules. (The model number of the I/P converter modules as componential units is KUX128.)

Each of the I/P converter modules converts an electrical signal of 4 - 20mA DC into a pneumatic signal of 0.2 - 1.0kgf/cm^2 (or 3 - Spsi, 0.2 - 1.0bar, or 20 - l00kpa).

Up to eight I/P converter modules can be installed in a file. Files are available in two types, namely, in a rack mount type and a wall mount type. Up to eight rack-mount files can be accommodated in a Azbil corporation TDC Standard Cabinet (JAST Cabinet), four at the front and other four at the rear. See Figs. 1 - 4.

1.2 Structure and Features

Each of the I/P converter modules can be readily installed into or removed from the file by means of two clamping-screws. As you install or remove the modules, their pneumatic connections are automatically made or sealed.

For the modules in the file, an air supply for the outputs and that for the nozzle back pressures are provided mutually separately. A pressure regulator for the nozzle back-pressures supply is provided in the file.

1.3 Notes for Handling

(a) Exercise care when handling the modules so that they are not subjected to mechanical shocks.

(b) Do not remove the cover of the modules.

2. SPECIFICATIONS

2.1 Performance Specifications

Item	Specification
Input signal	4 - 20mA DC (limit current approx. 30mA)
Input resistance	300Ω max.
Output signal	0.2 - 1.0kgf/cm², 3 - 15psi, 0.2 - 1.0bar, 20 - 100kpa (rated pressure 2kgf/cm²)
Air supply	1.4kgf/cm², +30%, -10%
Air consumption	< 4Nℓ/min. per module
Maximum air supply capacity	< 20Nℓ/min. per module
Maximum air exhaust capacity	< 20Nℓ/min. per module
Minimum load capacity	4mm-inner-diameter copper pipe x 3m + 20cc
Electrical connections	M3 x 6mm binding screws
Air connections	Rc1/4, 1/4NPT internal thread
Ambient temperature	0 to 50°C
Ambient humidity	10 to 90% RH
Accuracy	± 0.25% FS
Hysteresis	0.15% FS
Temperature characteristics	Zero shift: ± 1% FS/20°C (max.)
Housing	Indoor installation type
Installation	Wall mount or 19-inch rack mount (EIA, RS-310-B)
Weight	KUX111 with eight modules: Approx. 8.2kg Single unit of module: Approx. 0.4kg

2.2 Model No. Table

Model Number Structure of Multiple I/P Converters

Basic model No.	Selections							Options	Description
	Power supply	Input	Output	Connections	Modules	Installation	Environments		
KUX111									Multiple I/P Converters
	-X								None
		1							4 to 20mA DC
			1						0.2 to 1.0kgf/cm²
			2						3 to 15psi
			3						0.2 to 1.0bar
			4						20 to 100kpa
				A					Rc1/4
				B					1/4NPT internal thread
					0				File only
					1				File + 1 module
					2				File + 2 modules
					3				File + 3 modules
					4				File + 4 modules
					5				File + 5 modules
					6				File + 6 modules
					7				File + 7 modules
					8				File + 8 modules
						C			19-inch rack mount
						S			Wall mount
							X		Standard
							A		Tropicalization (special spec.)
							B		Corrosive atmosphere (special spec.)
								-X	No options

Model Number Structure of Converter Modules

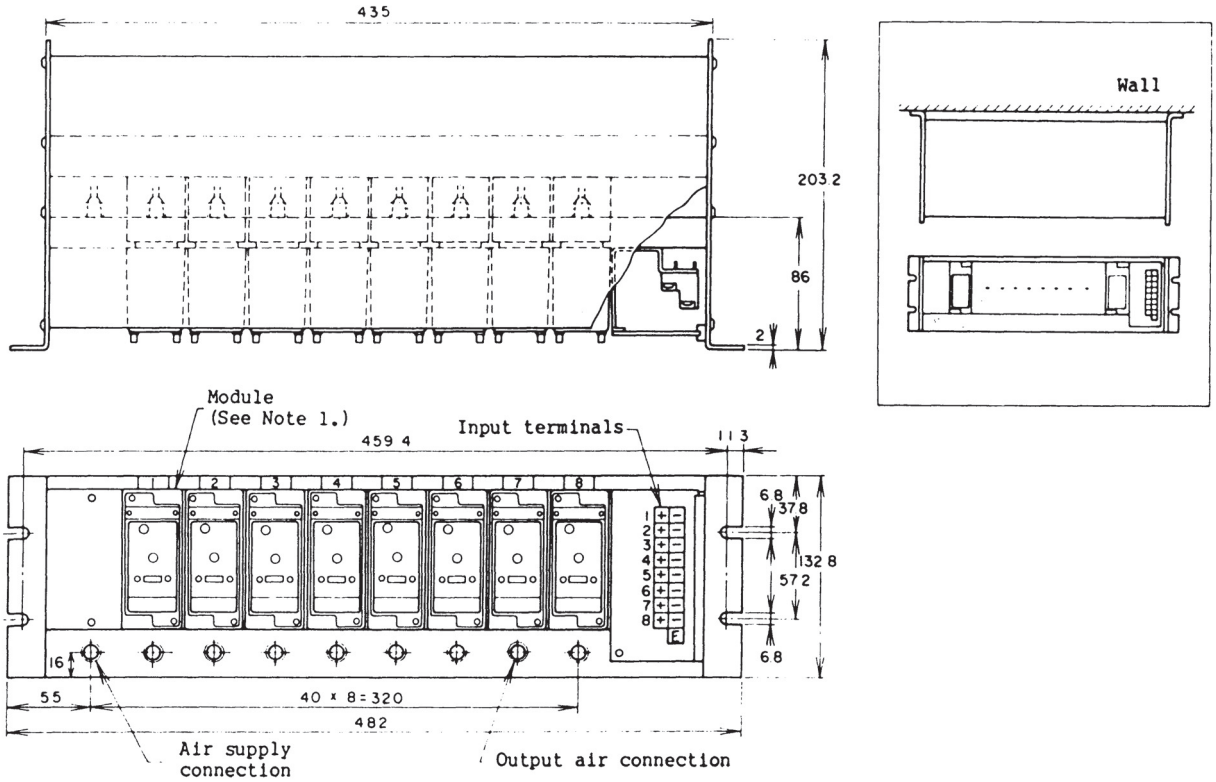
Selectable basic model No.	Selections				Options	Description
	Power supply	Input	Output	Environments		
KUX118						Converter Module (single independent unit)
	-X					None
		1				4 to 20mA
			1			0.2 to 1.0kgf/cm^2
			2			3 to 15psi
			3			0.2 to 1.0bar
			4			20 to 100kpa
				X		Standard
				A		Tropicalization (special spec.)
				B		Corrosive atmosphere (special spec.)
					-X	No options

2.3 Overall Dimensions

1) KUX111 (Unit: mm)

1-1) Rack Mount Type
(See Note 3.)

1-2) Wall Mount Type
See Notes 2 and 3.)



Notes:
1. The unoccupied file space is covered with a blind panel.
2. The wall-mount file differs from the rack-mount file in that the mounting brackets are fixed at the rear. The overall dimensions of both types of files are identical.
3. When installing two or more files being spaced of 200mm or more between two adjoining files.

2) Module (Single Unit)

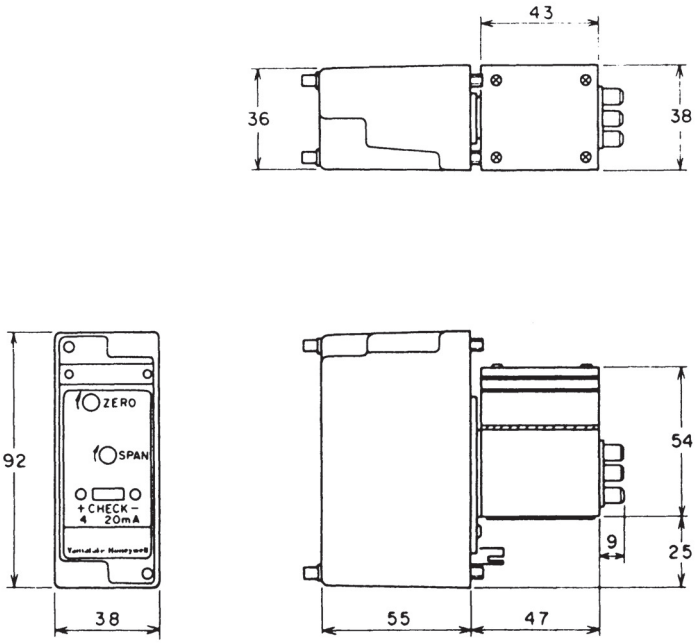


Fig. 5. Overall Dimensions

3. OPERATING PRINCIPLE

The electrical input signal (current signal) is converted by the magnet unit into a mechanical force which causes the beam position to change. The change in beam position is converted by the nozzle/flapper mechanism into a pneumatic signal, which is boosted by the pilot relay into the pneumatic output signal. The pneumatic output signal is fed back via the feedback bellows to the beam, thereby attaining an equilibrium state. Thus, the electrical input signal is converted into a pneumatic output signal which is directly proportional to the input signal.

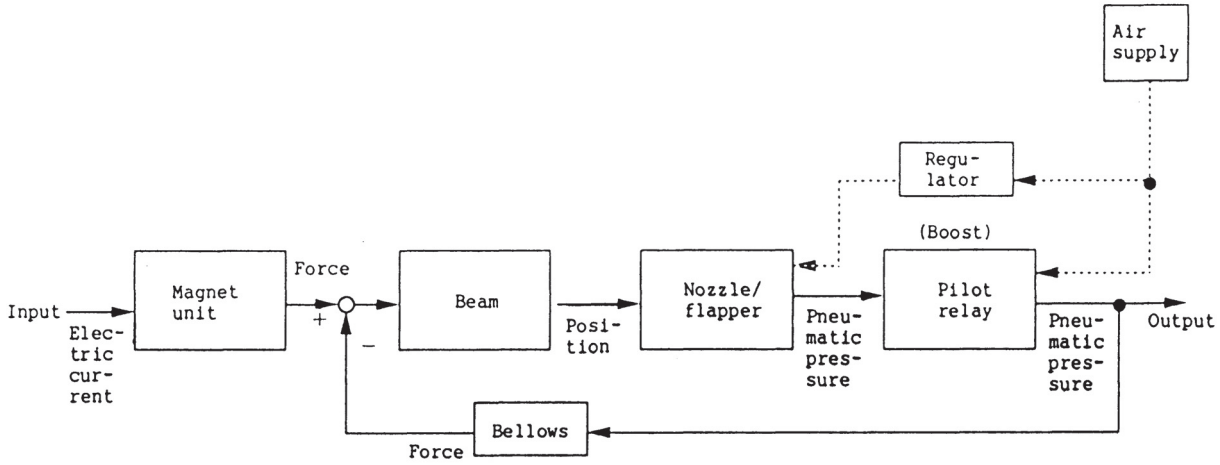


Fig. 6. Block Diagram of I/P Converter Module

4. INSTALLATION

4.1 Installation Dimensions

For the installation dimensions, see Fig. 5 "Overall Dimensions."

4.2 Ambient Conditions

The place of installation should be of the specification temperature and humidity ranges and should be reasonably free from mechanical vibration.

4.3 Customer Connections

(1) Electrical Input Signal Connections

Connect the electrical input signal(s) observing the terminal numbers indicated on the terminal cover. The terminal screws are M3 x 6mm.

The instrument has no internal fuses or switches. Provide them externally (employing wiring blocks for individual channels, recommendably).

(2) Pneumatic Output Connections

The pneumatic output connectors [Rc1/4 (or 1/4NPT internal thread)] is located at lower positions on the mother board. They are numbered 1 - 8 for respective converter modules.

4.4 Example of Wiring and Piping for Files Installed in Cabinet

A typical example of wiring and piping for eight files (four at the front and other four at the rear) installed in a Azbil corporation TDC Standard Cabinet (JAST Cabinet) is shown in Fig. 7. Make wiring and piping referring to this example.

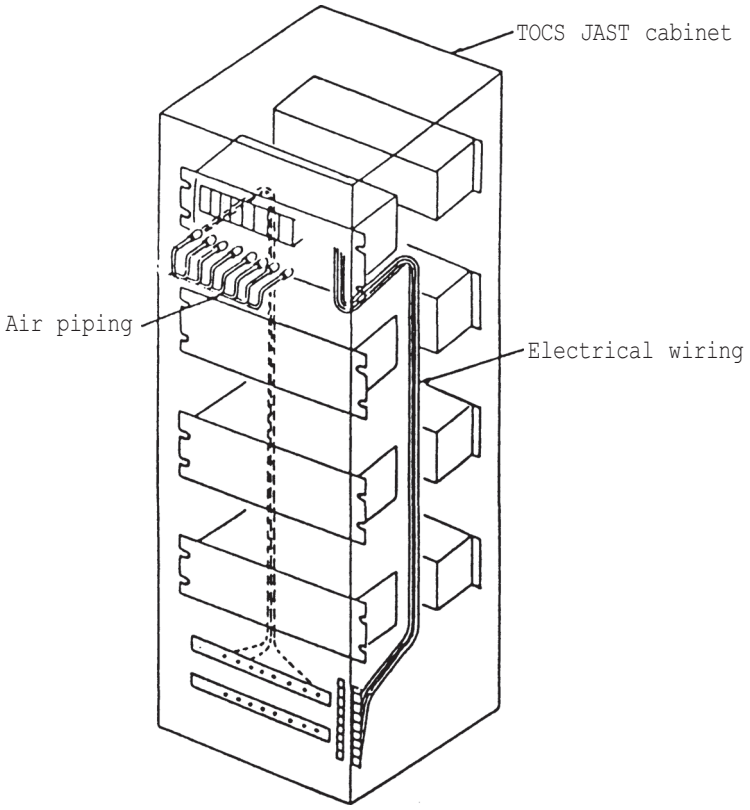


Fig. 7. Example of Wiring and Piping

4.5 Removing or Installing I/P Converter Modules

(1) Removing I/P Converter Modules

Each converter module can be removed from the mother board by loosening the two clamping-screws (one at the top and the other at the bottom). As you remove the module, the air connections are automatically closed.

(2) Installing I/P Converter Modules

To install each of the converter modules, align accurately the three air connection plugs and one electrical connector at the rear of the module with the corresponding three air connection ports and one electrical connector of the mother board and, in this alignment, push the module toward the mother board. Fix the module to the mother board with the two clamping-screws.

4.6 Connecting the Air Supply

Connect the air supply to the air supply connector which is located below the regulator for the nozzle back-pressure supply. The air supply must be a clean air of 1.4 ± 0.1kgf/cm² at the air supply connector and should be provided via an Airset (a regulator and a filter).

For such installation that the file is fully accommodating eight units of I/P converter modules and their signals vary largely and rapidly, use an Airset of a larger capacity.

4.7 Connecting the Electrical Input Signals

Connect the electrical input signals to the electrical input terminals. To gain access to the terminals, remove the terminal cover. Connect the corresponding wires to the "+", "-", and GND terminals. The channel numbers are indicated on the terminal cover.

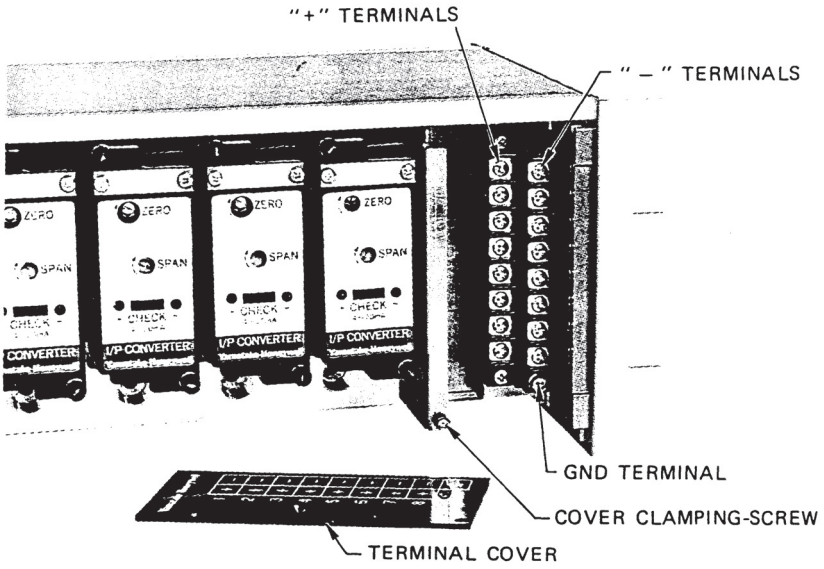


Fig. 8. Electrical Input Terminals

5. OPERATION PROCEDURE

When the I/P Converters are installed and electrical wiring and air piping are done, they are ready to operate. Provide the air supply.

Note: An input check diode (equivalent impedance 300 ohms) is provided in the input circuit of each I/P converter module. When converter modules or receiving instruments are operated in parallel (in series for the DC current signal), it is possible that overloading is caused to the output circuit of the signal source instrument (such as a controller). To prevent overloading, short the diode by connecting the socket jumper to the two pins which is located between the CHECK terminals on the front panel of the module (see Fig. 4).

6. ADJUSTMENT AND CALIBRATION

6.1 Adjustment of Regulator for Nozzle Back-pressure Supply

The regulator is adjusted before shipment of the I/P Converters and it normally is not required to be adjusted. However, it should be checked and adjusted when actions of the modules have become uniformly abnormal suggesting an incorrect nozzle back-pressure source pressure or when servicing the I/P Converters for periodical maintenance service. To adjust the regulator, proceed as follows:

(1) Remove all I/P converter modules from the mother board.

(2) Provide the air supply.

(3) Connect a pressure gauge to the right-most top one of the three air pressure check connectors of the mother board (see Fig. 9). Adjust the ADJ screw of the regulator so that the pressure gauge reads 1.2kgf/cm² ± 5%.

(4) To check the air supply, connect the pressure gauge to the left-most bottom one of the three air pressure check connectors as indicated with a dotted line in Fig. 9 and make sure that the pressure gauge reads 1.4 ± 0.1kgf/cm².

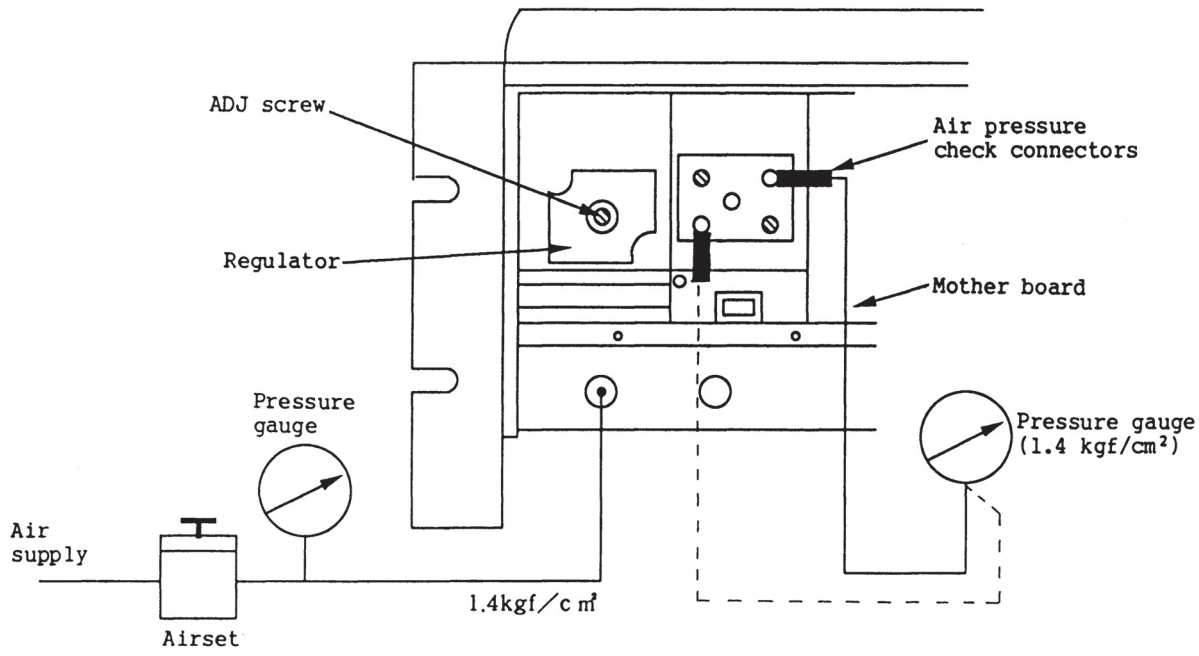


Fig. 9. Adjustment of Regulator

6.2 Adjustment and Calibration of Converter Modules

Remove the converter modules from the mother board and adjust and calibrate each of them employing a dedicated type of test stand as follows:

(1) Connect an air supply to the air supply connector and a precision air pressure gauge to the output air connector of the test stand*.

(2) Connect a precision electrical signal source (4 - 20mA DC) to the electrical input terminal of the test stand.

*: To be ordered separately.

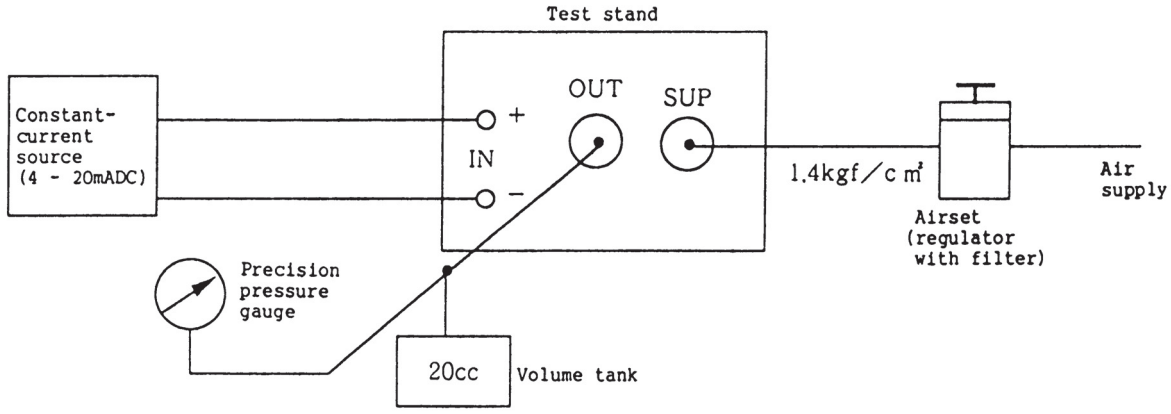


Fig. 10. Adjustment and Calibration Setup

(3) Install the converter module on the test stand in the same manner as installing it on the mother board.

(4) Feed a current signal of 4mA from the constant-current source. Adjust the ZERO control so that the output pressure becomes 0.2kgf/cm² ± 0.25%. The output pressure rises as you turn the ZERO control clockwise.

(5) Feed a current signal of 20mA from the constant-current source. Adjust the SPAN control so that the output pressure becomes 1.0kgf/cm² ± 0.25%. The output pressure rises as you turn the SPAN control clockwise.

(6) Repeat the procedures of steps (4) and (5) so that the required zero and span accuracies are attained.

7. CHECK TERMINALS OF CONVERTER MODULES

The input current signal of each converter module can be checked by connecting a milliammeter in the correct polarity between the CHECK terminals on the front panel. This can be employed only to check the input current and must not be used for adjustment and calibration described in Section 6.

Note: The input current check cannot be done when the socket jumper is connected to the two pins between the CHECK terminals as mentioned in the Note in Section 5.

8. RECOMMENDABLE REPLACEMENT SPARE PARTS

Parts	Dwg. No.
O-ring	80020935-003
O-ring kit	80357557-001
Regulator (with screws)	80357550-001
Gasket	80353359-001
Socket jumper	83953441-002
Blind plate	80357558-001
Air pressure check connector (with rubber tube)	80357559-001

Terms and Conditions

We would like to express our appreciation for your purchase and use of Azbil Corporation's products.

You are required to acknowledge and agree upon the following terms and conditions for your purchase of Azbil Corporation's products (system products, field instruments, control valves, and control products), unless otherwise stated in any separate document, including, without limitation, estimation sheets, written agreements, catalogs, specifications and instruction manuals.

1. Warranty period and warranty scope

   1.1 Warranty period

   Azbil Corporation's products shall be warranted for one (1) year from the date of your purchase of the said products or the delivery of the said products to a place designated by you.

   1.2 Warranty scope

   In the event that Azbil Corporation's product has any failure attributable to azbil during the aforementioned warranty period, Azbil Corporation shall, without charge, deliver a replacement for the said product to the place where you purchased, or repair the said product and deliver it to the aforementioned place. Notwithstanding the foregoing, any failure falling under one of the following shall not be covered under this warranty:

   (1) Failure caused by your improper use of azbil product (noncompliance with conditions, environment of use, precautions, etc. set forth in catalogs, specifications, instruction manuals, etc.);
   (2) Failure caused for other reasons than Azbil Corporation's product;
   (3) Failure caused by any modification or repair made by any person other than Azbil Corporation or Azbil Corporation's subcontractors;
   (4) Failure caused by your use of Azbil Corporation's product in a manner not conforming to the intended usage of that product;
   (5) Failure that the state-of-the-art at the time of Azbil Corporation's shipment did not allow Azbil Corporation to predict; or
   (6) Failure that arose from any reason not attributable to Azbil Corporation, including, without limitation, acts of God, disasters, and actions taken by a third party.

   Please note that the term "warranty" as used herein refers to equipment-only-warranty, and Azbil Corporation shall not be liable for any damages, including direct, indirect, special, incidental or consequential damages in connection with or arising out of Azbil Corporation's products.

2. Ascertainment of suitability

   You are required to ascertain the suitability of Azbil Corporation's product in case of your use of the same with your machinery, equipment, etc. (hereinafter referred to as "Equipment") on your own responsibility, taking the following matters into consideration:

   (1) Regulations and standards or laws that your Equipment is to comply with.
   (2) Examples of application described in any documents provided by Azbil Corporation are for your reference purpose only, and you are required to check the functions and safety of your Equipment prior to your use.
   (3) Measures to be taken to secure the required level of the reliability and safety of your Equipment in your use
   Although azbil is constantly making efforts to improve the quality and reliability of Azbil Corporation's products, there exists a possibility that parts and machinery may break down. You are required to provide your Equipment with safety design such as fool-proof design,*1 and fail-safe design*2 (anti-flame propagation design, etc.), whereby preventing any occurrence of physical injuries, fires, significant damage, and so forth. Furthermore, fault avoidance,*3 fault tolerance,*4 or the like should be incorporated so that the said Equipment can satisfy the level of reliability and safety required for your use.

   *1. A design that is safe even if the user makes an error.
   *2. A design that is safe even if the device fails.
   *3. Avoidance of device failure by using highly reliable components, etc.
   *4. The use of redundancy.

3. Precautions and restrictions on application

   3.1 Restrictions on application

   Please follow the table below for use in nuclear power or radiation-related equipment.

	Nuclear power quality*5 required	Nuclear power quality*5 not required
Within a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Cannot be used (except for limit switches for nuclear power*7)
Outside a radiation controlled area*6	Cannot be used (except for limit switches for nuclear power*7)	Can be used

   *5. Nuclear power quality: compliance with JEAG 4121 required
   *6. Radiation controlled area: an area governed by the requirements of article 3 of "Rules on the Prevention of Harm from Ionizing Radiation," article 2 2 4 of "Regulations on Installation and Operation of Nuclear Reactors for Practical Power Generation," article 4 of "Determining the Quantity, etc., of Radiation-Emitting Isotopes,"etc.
   *7. Limit switch for nuclear power: a limit switch designed, manufactured and sold according to IEEE 382 and JEAG 4121.

   Any Azbil Corporation's products shall not be used for/with medical equipment.

   The products are for industrial use. Do not allow general consumers to install or use any Azbil Corporation's product. However, azbil products can be incorporated into products used by general consumers. If you intend to use a product for that purpose, please contact one of our sales representatives.

   3.2 Precautions on application

   you are required to conduct a consultation with our sales representative and understand detail specifications, cautions for operation, and so forth by reference to catalogs, specifications, instruction manual, etc. in case that you intend to use azbil product for any purposes specified in (1) through (6) below. Moreover, you are required to provide your Equipment with fool-proof design, fail-safe design, anti-flame propagation design, fault avoidance, fault tolerance, and other kinds of protection/safety circuit design on your own responsibility to ensure reliability and safety, whereby preventing problems caused by failure or nonconformity.

(1) For use under such conditions or in such environments as not stated in technical documents, including catalogs, specification, and instruction manuals
(2) For use of specific purposes, such as:
    * Nuclear energy/radiation related facilities
      [When used outside a radiation controlled area and where nuclear power quality is not required]
      [When the limit switch for nuclear power is used]
    * Machinery or equipment for space/sea bottom
    * Transportation equipment
      [Railway, aircraft, vessels, vehicle equipment, etc.]
    * Antidisaster/crime-prevention equipment
    * Burning appliances
    * Electrothermal equipment
    * Amusement facilities
    * Facilities/applications associated directly with billing
(3) Supply systems such as electricity/gas/water supply systems, large-scale communication systems, and traffic/air traffic control systems requiring high reliability
(4) Facilities that are to comply with regulations of governmental/public agencies or specific industries
(5) Machinery or equipment that may affect human lives, human bodies or properties
(6) Other machinery or equipment equivalent to those set forth in items (1) to (5) above which require high reliability and safety

4. Precautions against long-term use

Use of Azbil Corporation's products, including switches, which contain electronic components, over a prolonged period may degrade insulation or increase contact-resistance and may result in heat generation or any other similar problem causing such product or switch to develop safety hazards such as smoking, ignition, and electrification. Although acceleration of the above situation varies depending on the conditions or environment of use of the products, you are required not to use any Azbil Corporation's products for a period exceeding ten (10) years unless otherwise stated in specifications or instruction manuals.

5. Recommendation for renewal

Mechanical components, such as relays and switches, used for Azbil Corporation's products will reach the end of their life due to wear by repetitious open/close operations.

In addition, electronic components such as electrolytic capacitors will reach the end of their life due to aged deterioration based on the conditions or environment in which such electronic components are used. Although acceleration of the above situation varies depending on the conditions or environment of use, the number of open/close operations of relays, etc. as prescribed in specifications or instruction manuals, or depending on the design margin of your machine or equipment, you are required to renew any Azbil Corporation's products every 5 to 10 years unless otherwise specified in specifications or instruction manuals. System products, field instruments (sensors such as pressure/flow/level sensors, regulating valves, etc.) will reach the end of their life due to aged deterioration of parts. For those parts that will reach the end of their life due to aged deterioration, recommended replacement cycles are prescribed. You are required to replace parts based on such recommended replacement cycles.

6. Other precautions

Prior to your use of Azbil Corporation's products, you are required to understand and comply with specifications (e.g., conditions and environment of use), precautions, warnings/cautions/notices as set forth in the technical documents prepared for individual Azbil Corporation's products, such as catalogs, specifications, and instruction manuals to ensure the quality, reliability, and safety of those products.

7. Changes to specifications

Please note that the descriptions contained in any documents provided by azbil are subject to change without notice for improvement or for any other reason. For inquires or information on specifications as you may need to check, please contact our branch offices or sales offices, or your local sales agents.

8. Discontinuance of the supply of products/parts

Please note that the production of any Azbil Corporation's product may be discontinued without notice. After manufacturing is discontinued, we may not be able to provide replacement products even within the warranty period.

For repairable products, we will, in principle, undertake repairs for five (5) years after the discontinuance of those products. In some cases, however, we cannot undertake such repairs for reasons, such as the absence of repair parts. For system products, field instruments, we may not be able to undertake parts replacement for similar reasons.

9. Scope of services

Prices of Azbil Corporation's products do not include any charges for services such as engineer dispatch service. Accordingly, a separate fee will be charged in any of the following cases:

(1) Installation, adjustment, guidance, and attendance at a test run
(2) Maintenance, inspection, adjustment, and repair
(3) Technical guidance and technical education
(4) Special test or special inspection of a product under the conditions specified by you

Please note that we cannot provide any services as set forth above in a nuclear energy controlled area (radiation controlled area) or at a place where the level of exposure to radiation is equivalent to that in a nuclear energy controlled area.

Document Number:	OM2-5900-1110
Document Name:	Multi I/P Converter Model KUX111 User's Manual
Date:	3rd edition: Jan. 2020
Issued/Edited by:	Azbil Corporation

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