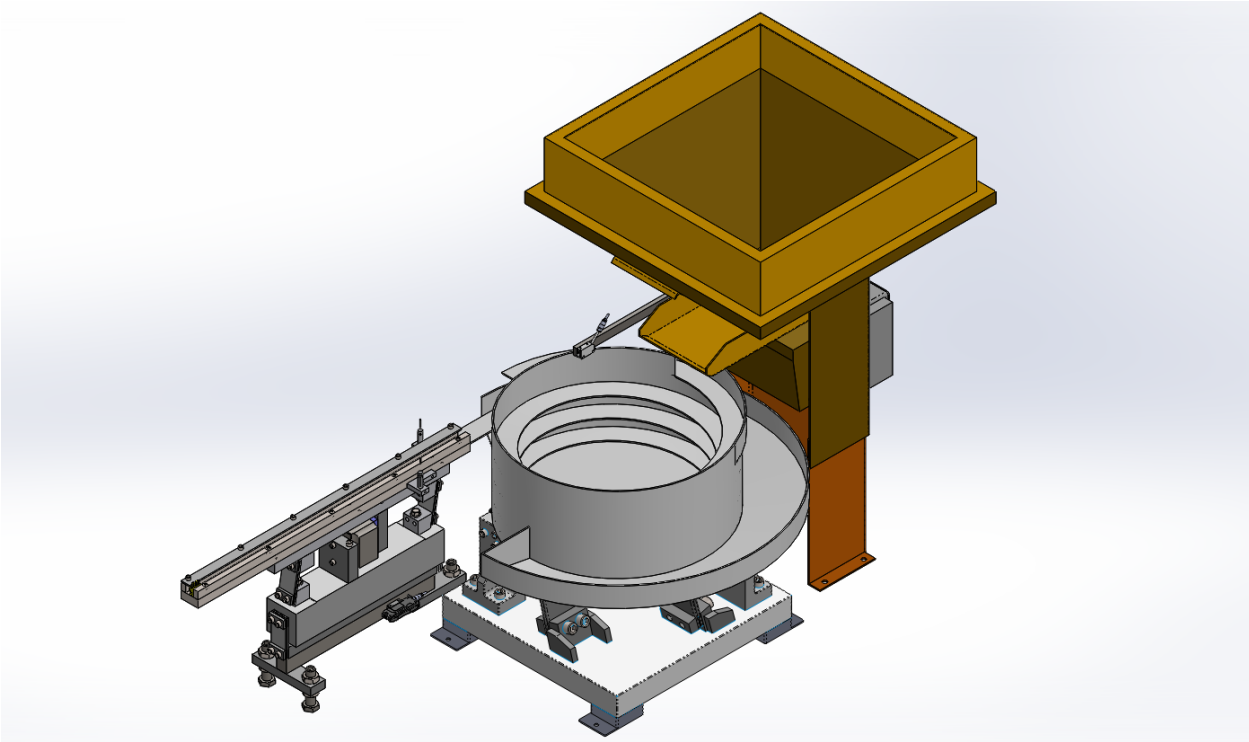
MILLER'S FEEDING SOLUTIONS, INC.
MANUFACTURERS OF VIBRATORY FEED SYSTEMS AND PARTS HANDLING EQUIPMENT
10721 75TH STREET NORTH, LARGO, FL 33777-1437
PH: 727-541-5763 – FAX: 727-541-5548

SET UP AND INSTRUCTION MANUAL



Miller's Feeding Solutions (MFS) is committed to the highest quality fabrication of parts handling equipment to meet or exceed customer expectations and production rates. Recognized for innovative technology for even the most difficult of high-rate parts feeding projects, product reliability, sound reduction to meet OSHA standards.

MFS is your partner in productivity operations, ensuring optimum efficiency in feeding solutions.

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MFS

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Inspection Un-Crating, and Setup

1) Inspect the crate for any visible damage. If there is any visible damage, **TAKE PICTURES OF ALL DAMAGED AREAS AND CONTACT THE CARIER AT ONCE TO REPOST THE DAMAGE AND FILE A CLAIM!!**
2) If there is no visible damage, carefully open the crate and inspect the system. If everything appears undamaged proceed with opening and remove system from crate using standard millwright practices.
   a) Make sure that nothing has worked its way loose in transit and fallen off of the system, check the bottom of the crate.
   b) Mount or install any components or accessories that may have been disassembled for shipping or shipped separate from the system or may have come loose.

3) The machine should be put into position by means of standard Millwright Practices for moving and final positioning.
   a) The machine should then be leveled to approximately .005 inches per foot in all directions (level sitting on the table), and sitting on a solid surface with all feet down and locked in place. **NOTE: Be sure that all shipping, clamps and materials are removed from the system at this time.**

4) A qualified Electrician should connect the machine to the proper electrical supply line.
   a) See the electrical schematics for power requirements and specifications.
   b) This must be done using standard electrical practices and local codes for all connections.

5) A qualified plumber or pipe fitter should make the proper air connections following standard plumbing practices and local codes.
   a) The machine should have a clean and dry air supply of at least 80 psi (unless otherwise specified – see Systems Settings sheet).
   b) The machine must be plumbed with a large enough pipe for adequate flow to operate efficiently without any pressure drop during normal operation with all air requirements on and in use.

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Intended Use of Machine

This machine is designed and manufactured for use on specific parts. It removes individual parts from a bulk container and presents them oriented for pickup.

This machine is not to be used for any other purposes or parts than for which it was intended.

Warnings

1. **DO NOT** operate this machine without all guards and safety equipment in place and operations.
2. Only qualified people should work on and operate this machine.
3. Machine must only be moved by forklift Truck capable of lifting its full weight.
4. Before servicing or repairing, always disconnect Electrical Supply and familiarize yourself with the relevant Lockout/Tag Out procedures and instructions.
5. Never use this machine in any manner, other than it's intended use.
6. This machine must always be connected to earth.
7. As with all Machinery, loose or baggie clothing should not be worn while operating this machine.

Safety

We strongly recommend using the following Personal Protective Equipment:

1. Ear Protection
2. Safety Glasses
3. Safety Shoes

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Lockout/Tag Out Procedure

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done to the MFS Housing Feed equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

This procedure establishes the minimum requirements for the lockout of energy isolating devices whenever maintenance or servicing is done to the MFS Housing Feed equipment. It shall be used to ensure that the machine or equipment is stopped, isolated from all potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.

All employees are required to comply with the restrictions and limitations imposed upon them during the use of Lockout/Tag Out. The authorized employees are required to perform the lockout in accordance with this procedure. All employees, upon observing a machine or piece of equipment which is locked Out and Tagged Out to perform servicing or maintenance shall not attempt to start, energize, or use that machine or equipment.

1. Notify all affected employees that servicing or maintenance is required on a machine or equipment and that the machine or equipment must be shut down and locked out to perform the servicing or maintenance.
2. The authorized employee shall refer to the company procedure to identify the type and magnitude of the energy that the machine or equipment utilizes, shall understand the hazards of the energy, and shall know the methods to control the energy.
3. If the machine or equipment is operating, shut it down by the normal stopping procedure (depress the stop button, open switch, close valve, etc.).
4. De-activate the energy isolating device(s) so that the machine or equipment is isolated from the energy source(s).
5. Lock out the energy isolating device(s) with assigned individual lock(s) and apply tags to increase visibility and awareness that machine is not energized or activated until locks and tags are removed.
6. Stored or residual energy (such as that in capacitors, springs, elevated machine members, rotating flywheels, hydraulic systems, and air, gas, steam, or water pressure, etc.) must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down, etc.
7. Ensure that the equipment is disconnected from the energy source(s) by first checking that no personnel are exposed, then verify the isolation of the equipment by operating the push button or other normal operating control(s) or by testing to make certain the equipment will not operate.
   Caution: Return operating control(s) to neutral or "off" position after verifying the isolation of the equipment. The machine or equipment is now locked and tagged out.

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Lockout/Tag Out Procedure "Restore"

1. **Restoring Equipment to Service.** When the servicing or maintenance is completed and the machine or equipment is ready to return to normal operating condition, the following steps shall be taken.
2. Check the machine or equipment and the immediate area around the machine to ensure that nonessential items have been removed and that the machine or equipment components are operationally intact.
3. Check the work area to ensure that all employees have been safely positioned or removed from the area.
4. Verify that the controls are in neutral.
5. Remove the lockout devices and reenergize the machine or equipment. Note: The removal of some forms of blocking may require re-energization of the machine before safe removal.
6. Notify affected employees that the servicing or maintenance is completed and the machine or equipment is ready for used.

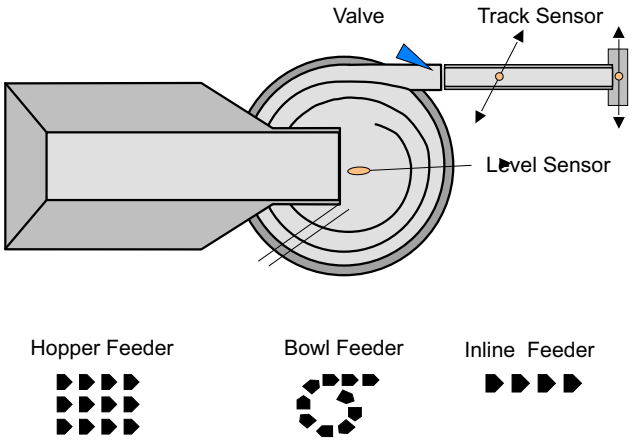
Shipping and Transport Instructions

1. A qualified Electrician should disconnect the machine from the electrical supply line.
   a. See the electrical schematics for power requirements and specifications.
2. This must be done using standard electrical practices and local codes.
3. The machine should be removed from its position by means of standard Millwright Practices for moving to shipping.
4. Carefully crate system.
5. Make sure that nothing can work its way loose in transit or fall off of the system.
6. Some components or accessories that may have to be shipped separate from the system or mounted separately in the crate with the system. Be sure these items are secure and protected during shipping.

REO-USA, Inc.
3250 North Post Road, Suite 132
Indianapolis, IN 46226
Phone (317) 899-1395 Fax (317) 899-1396
www.reo-usa.com info@reo-usa.com

REOVIB MTS 443
Thyristor Controller for Vibratory Feeders

Feed Station with Bowl, Inline and Hopper feeder



3-Channel Thyristor Controller for Vibratory Feeder

A Compact control unit for a typical parts-feeding station comprising Bowl, Linear and Hopper Feeder.

- With integral functions for track control, solenoid valve and warning signals
- Touch panel with Text/Graphic display for all settings and adjustments
- Control Inputs and Outputs
- 3 Sensor Inputs for Track and Air Jet Control
- 2 x 24 VDC outputs for Air Valve or level sensor
- 2 x Status for 'READY' Mains ON and 'ENABLE ON' conditions
- 1 x Enable input, 24 VDC or volt-free contacts
- 3 x 0..210 V Feeder Outputs

General:
The interlocking of channels is predetermined and cannot be altered. The unit enable also enables the linear feeder and all other feeders. If the bowl feeder is inhibited then the hopper feeder also stops.

Sensors 1 and 3 can be configured for Track control, Sensor 3 can also be configured for an Air-Jet reject output.
Sensor 2 is always used to control the hopper feeder

24V Output 1 switches ON as the bowl feeder starts and switches OFF after a 0...60 secs delay. Should an air-valve be required to operate before the bowl feeder starts then the soft start time should be increased

24 V Output 2 can be used to indicate that components are present on a transfer section at the end of the linear feeder or for controlling an airjet. The output can then be controlled from sensor 3 and ON/OFF time delays can be adjusted in the program under 'AIR JET'

In the **LOGIC** menu Sensors 1 and 3 can be configured for track control (MIN/MAX), OR AND or twin track/air operation

Overview of Functions:

Feeder
Feeder Throughput
Invert Enable
Ramp up time
Ramp down time
Maximum limit
Vibrating Frequency Full/Half Wave

Track Control
Sensor 1 Invert
Switch ON delay
Switch OFF delay
Empty warning

Hopper Control
Sensor 3 Invert
Switch ON delay
Switch OFF delay
Empty warning

Solenoid Output
Output 1: ON with bowl feeder/ delayed OFF
Output 2: Using sensor 3
Air jet or 'Present' signal
Switch ON delay
Switch OFF delay

Air Jet / Present
Sensor 3 Invert
Switch ON delay
Switch OFF delay

Logic
Sensor 1 / Sensor 3
MIN-MAX Vibration levels
AND
OR
Twin Track / Air

Technical Data:

	MTS 443/10A	MTS 443/15A
Supply Voltage:	110 / 240 V, 50/60 Hz	
Supply Current:	max 10 A, RMS	max. 15 A, RMS
Output Voltage per channel:	0...100 / 0...210 V	
Output Current:	**max. 10 A , RMS**	**max. 15 A, RMS**
Output Current Chan 1:	max. 8 A, RMS	max. 10 A, RMS
Output Current Chan 2:	max. 6 A, RMS	max. 8 A, RMS
Output Current Chan 3:	max. 6 A, RMS	max. 6 A, RMS
Sensor type:	PNP, 24 V	
Output Status:	24 V, DC, 20 mA	Total current
Control Output 1:	24 V, 200 mA	of ALL control outputs
Control Output 2:	24 V, 200 mA	400 mA
Time out Status - Track:	24 V, 200 mA	
Time out Status - Hopper:	24 V, 200 mA	
Enable Input:	24 V, 10 mA	
Operating temp:	0... 45°C	
Storage temp:	-10...80 °C	
Recommended Fusing:	16 A	

Declaration of Conformity

We declare that this product conforms with the following standards:-

EN 50081-2 and EN 50082-2 in accordance with directive 89/336/EWD

REO ELEKTRONIK AG, D-42657 Solingen

Specified Use

The units described in this document are electrical goods for use in an industrial environment. They designed for the control of electromagnetic vibratory feeders

Settings:

	Range	Default
Linear Feeder:		
Feeder Speed:	0...100 %	0 %
Enable Invert:	0 / 1	1
Ramp up time:	0...60 Sec.	5 Sec.
Ramp down time:	0...60 Sec.	5 Sec.
Max Output:	5...100 %	90 %
Half Wave:	0 / 1	0
Bowl Feeder:		
Feeder Speed:	0...100 %	0 %
Enable Invert:	0 / 1	1
Ramp up time:	0...60 Sek.	5 Sek.
Ramp down time:	0...60 Sek.	5 Sek.
Max Output:	5...100 %	90 %
Half Wave:	0 / 1	0

	Range	Default
Hopper Feeder:		
Feeder Speed:	0...100%	0 %
Enable Invert:	0 / 1	1
Ramp up time:	0...60 Sec.	5 Sec.
Ramp down time:	0...60 Sec.	5 Sec.
Max Output:	5...100 %	90 %
AC-Motor for Hopper:	0 / 1	0
Half Wave:	0 / 1	0
Hopper Pulse Feed ON Time:	0... 60 Sek.	
Hopper Pulse Feed OFF Time:	0... 60 Sek.	
Track Control:		
Invert Enable:	0 / 1	0
Switch ON delay:	0...60 Sec.	5 Sec.
Switch OFF delay:	0...60 Sec.	5 Sec.
2nd Setpoint activate:	0 / 1	0:
Time-out activate	0 / 1	0
Time-out time:	30...180 Sec	

	Range	Default
Hopper Feed Control:		
Enable invert :	0 / 1	0
Switch ON delay:	0...60 Sec.	5 Sec.
Switch OFF delay:	0...60 Sec.	5 Sec.
Time-out activate:	0 / 1	0
Time-out time:	30...180 Sec.	30 Sec.
24V Output 1:		
ON Time:	0...60 Sec.	5 Sec.
24V Output 2:		
Switch ON delay:	0...60 Sec.	1 Sec.
Switch OFF delay:	0...60 Sec.	1 Sec.
Sensor Logic:		
MIN-MAX:	0 / 1	0
AND:	0 / 1	0
OR:	0 / 1	0
Twin Track:	0 / 1	0
Any Channel:	0 / 1	0

Safety Instructions

This description contains the necessary information for the correct application of the product described below. It is intended for use by technically qualified personnel.

Qualified personnel are persons who, because of their training, experience and position as well as their knowledge of appropriate standards, regulations, health and safety requirements and working conditions are authorised to be responsible for the safety of the equipment at all times, whilst carrying out their normal duties and are therefore aware of and can report possible hazards (Definition of qualified employees according to IEC 364)

WARNING !
Hazardous Voltage!

Failure to observe can kill, cause serious injury or damage
Isolate from mains before installation or dismantling, as well as for fuse changes or post installation modifications
Observe the prescribed accident prevention and safety rules for the specific application
Before putting into operation check if the rated voltage for the unit conforms with the local supply voltage
Emergency stop devices must be provided for all applications, operation of the emergency stop must inhibit any further uncontrolled operation
Electrical connections must be covered
The earth connection must be checked for correct function after installation and prior to operation

Installation

! Check !	Are the supply, feeder coil and controller input voltages correct ? Is the controller adequate for the rated power of the feeder? Is the vibrating frequency set to the correct value for the feeder ?
Connect the unit in accordance with the wiring instructions and ensure that the earthing is correct !	
Beware !	An incorrect feeder frequency setting can cause drive coil (magnet) damage. Ensure that the output frequency of the control unit matches the frequency of the connected coil
Important !	New units are factory set to the parameters shown in the setting table (Default) If there is any doubt with regard to the settings, the factory defaults can be re-instated from the service menu

We reserve the right to make technical changes should we deem them necessary.

User Menu:

Throughput Power:
1. Hopper Feeder
2. Bowl Feeder
3. Linear Feeder

Hopper Feeder:
1. Invert the enable input (only possible in 'Independent' operating mode)
2. Ramp up time of the feeder after start signal.
3. Ramp down time of the feeder after stop signal
4. Maximum limit of the feeder throughput (Output Voltage)
5. Output for switching a conveyor hopper with 1 ph motor (Output voltage = Supply voltage).
6. Vibration frequency of the feeder Full/Half wave.
7. Switch ON time for pulsed operation of hopper feed.
8. Switch OFF time for pulsed operation of hopper feeder (switch OFF time = 0, corresponds to continuous duty

Bowl:
1. Invert the enable input (only possible in 'Independent' operating mode')
2. Ramp up time of the feeder after start signal.
3. Ramp down time of the feeder after stop signal
4. Maximum limit of the feeder throughput (Output Voltage)
5. Vibration frequency of the feeder Full/Half wave.
6. ON Time for an air valve (24V Output 1)

Linear Feeder
1. Invert the enable input (only possible in 'Independent' operating mode'
2. Ramp up time of the feeder after start signal
3. Ramp down time of the feeder after stop signal
4. Maximum limit of the feeder throughput (Output Voltage)
5. Vibration frequency of the feeder Full/Half wave

Hopper Sensor:
1. Invert the input function
2. Switch-ON time delay for Hopper Feeder
3. Switch-OFF time delay for Hopper Feeder
4. Activate Stop signal for the Hopper Feeder. (Feeder stops after Time-Out has elapsed, only when '1')
5. Time out Delay

Track Sensor:
1. Invert the input function
2. Switch-ON time delay for Bowl Feeder
3. Switch-OFF time delay for Hopper Feeder
4. Activate operation with two feed levels. Regulates the track feed without time delays by switching between feed rate levels
5. Activate Stop signal for the Hopper Feeder. (Feeder stops after Time-Out has elapsed, only when '1')
6. Time out Delay

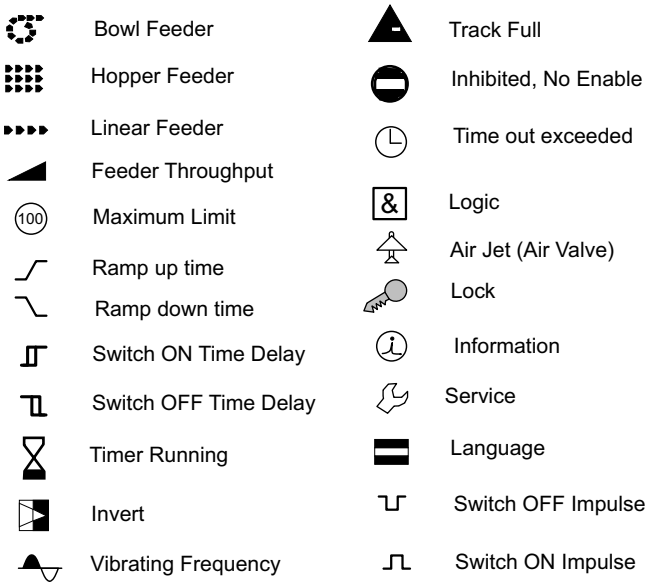
Air Jet / Present:
1. Invert the input function
2. Switch ON time delay for 24 V Output 2.
3. Switch OFF time delay for 24 V Output 2.

Logic:
1. Min-Max Track control using Sensors 1 and Sensor 3.
2. OR-Interlock with Sensor 1 OR Sensor 3 (Use Track switching for interlock output)
3. AND-Interlock with Sensor 1 AND Sensor 3 (Use Track switching for interlock output)
4. Used with twin tracks on a linear feeder with an air-jet ejection of the filled track (Sensor 1 & Sensor 2)

Info:
Software version, date and configuration

Service:
1. Fault Reset
2. Reinstate Factory Settings
3. Select User Settings (4 User Parameters 0...3)
4. Reload selected User Parameter set
5. Choose language
6. Key number for locking

Symbol



Time out Function:

The Time Out function can be used to warn that the hopper or bowl feeder have run out of product, but still allowing the feeder to run. If it is required that the feeder stops after the Time-Out delay has elapsed, the 'Time Out ON' must be set to '1' in the sensor menu.

When the Time-Out occurs the feeder stops, the corresponding output is energised and a clock symbol is displayed.

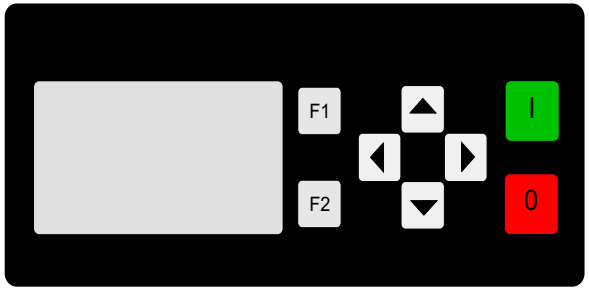
A Time-Out signal or shutdown can be reset with the green '1' key on the touch panel or by operation of the associated sensor.

Settings

Run Mode

80.0 %
90.0 %
70.0 %

1. Select Function Group
2. Select Function
3. Set Function
4. Further or END



Start (All Channels) / Reset Time Out

Stop (All Channels)

Unit reverts to Run Mode
If no keys are pressed for approx 5 secs

Function keys F1 & F2 are not used!

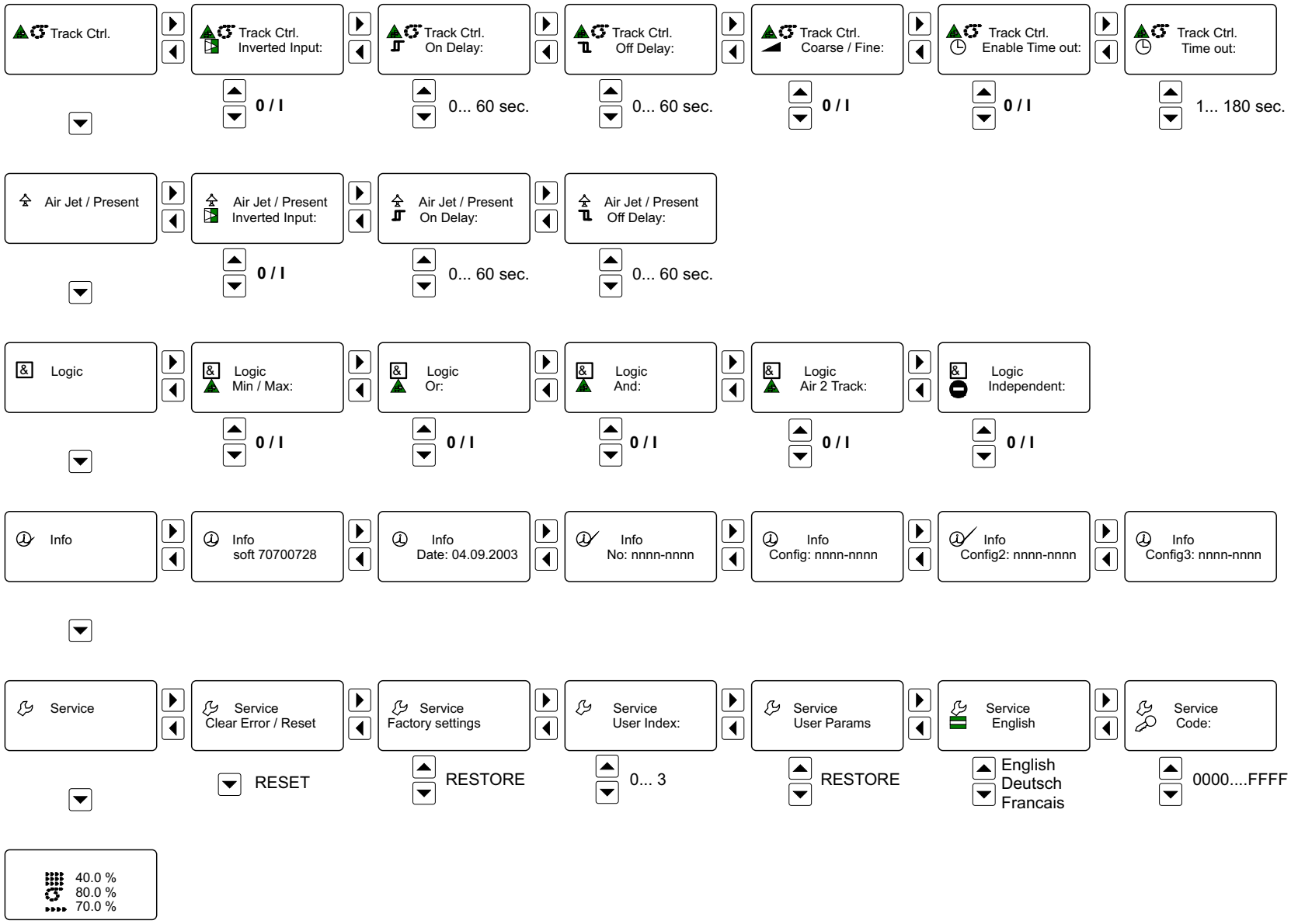
Speed → Speed Hopper: (0... 100 %) → Speed Bowl: (0... 100 %) → Speed Inline: (0... 100 %)

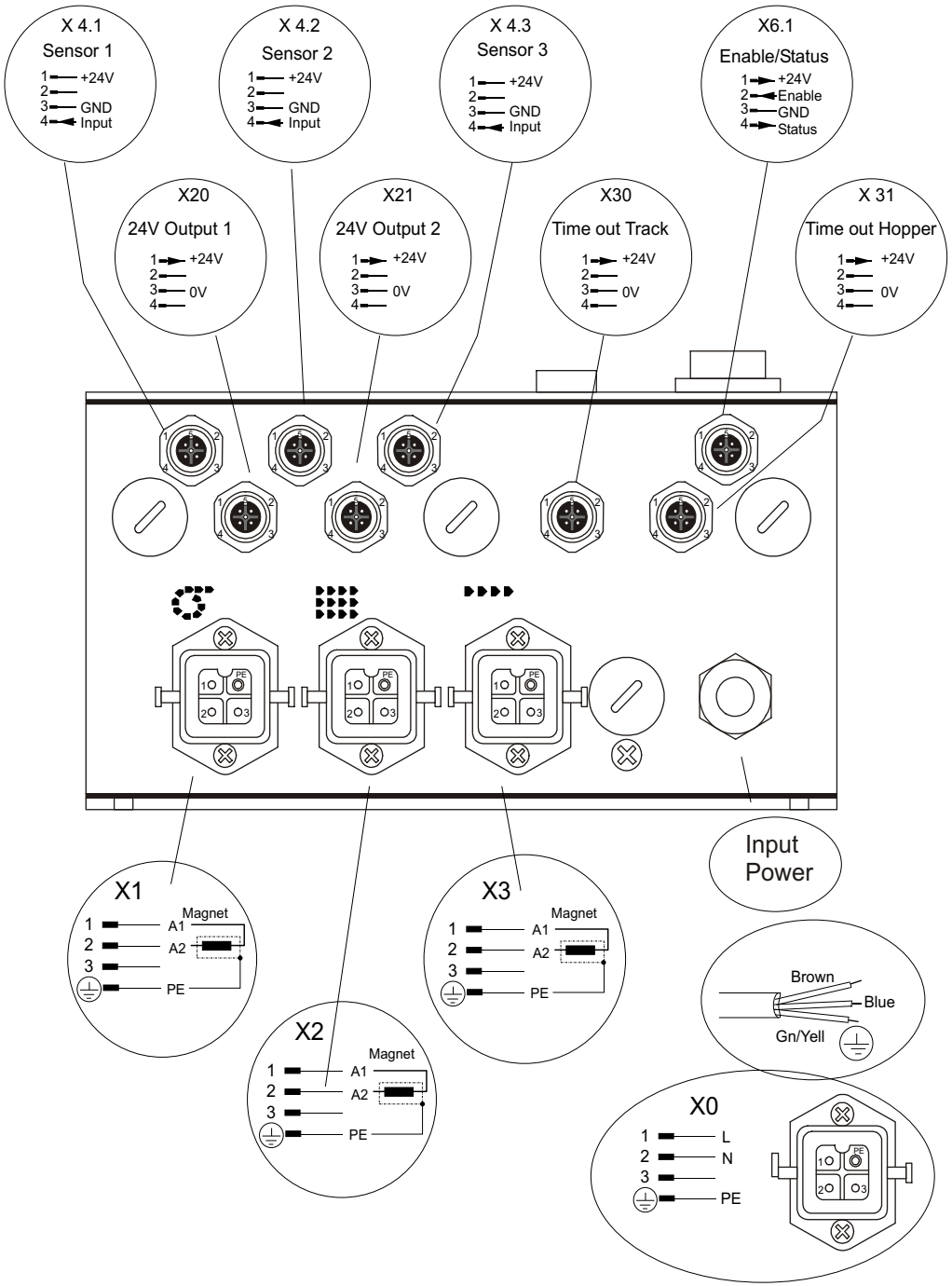
Hopper Feeder → Hopper Feeder Inverted Enable: (I / 0) → Hopper Feeder Soft Start: (0... 60 sec.) → Hopper Feeder Soft Stop: (0... 60 sec.) → Hopper Feeder Max: (5...100 %) → Hopper Feeder AC Motor: (I / 0) → Hopper Feeder Half Wave: (I / 0) → Hopper Feeder Time On: (0... 60 sec.) → Hopper Feeder Time Off: (0... 60 sec.)

Bowl Feeder → Bowl Feeder Inverted Enable: (I / 0) → Bowl Feeder Soft Start: (0... 60 sec.) → Bowl Feeder Soft Stop: (0... 60 sec.) → Bowl Feeder Max: (5...100 %) → Bowl Feeder Half Wave: (I / 0) → Bowl Feeder Air delay: (0... 60 sec.)

Linear Feeder → Inline Feeder Inverted Enable: (I / 0) → Inline Feeder Soft Start: (0... 60 sec.) → Inline Feeder Soft Stop: (0... 60 sec.) → Inline Feeder Max: (5...100 %) → Inline Feeder Half Wave: (I / 0)

Hopper Ctrl. → Hopper Ctrl. Inverted Input: (I / 0) → Hopper Ctrl. On Delay: (0... 60 sec.) → Hopper Ctrl. Off Delay: (0... 60 sec.) → Hopper Ctrl. Enable Time out: (5...100 %) → Hopper Ctrl. Time out: (1... 180 sec.)


Track Ctrl.
Track Ctrl. Inverted Input:
0 / I
Track Ctrl. On Delay:
0... 60 sec.
Track Ctrl. Off Delay:
0... 60 sec.
Track Ctrl. Coarse / Fine:
0 / I
Track Ctrl. Enable Time out:
0 / I
Track Ctrl. Time out:
1... 180 sec.
Air Jet / Present
Air Jet / Present Inverted Input:
0 / I
Air Jet / Present On Delay:
0... 60 sec.
Air Jet / Present Off Delay:
0... 60 sec.
Logic
Logic Min / Max:
0 / I
Logic Or:
0 / I
Logic And:
0 / I
Logic Air 2 Track:
0 / I
Logic Independent:
0 / I
Info
Info soft 70700728
Info Date: 04.09.2003
Info No: nnnn-nnnn
Info Config: nnnn-nnnn
Info Config2: nnnn-nnnn
Info Config3: nnnn-nnnn
Service
Service Clear Error / Reset
RESET
Service Factory settings
RESTORE
Service User Index:
0... 3
Service User Params
RESTORE
Service English
English
Deutsch
Francais
Service Code:
0000....FFFF
40.0 %
80.0 %
70.0 %



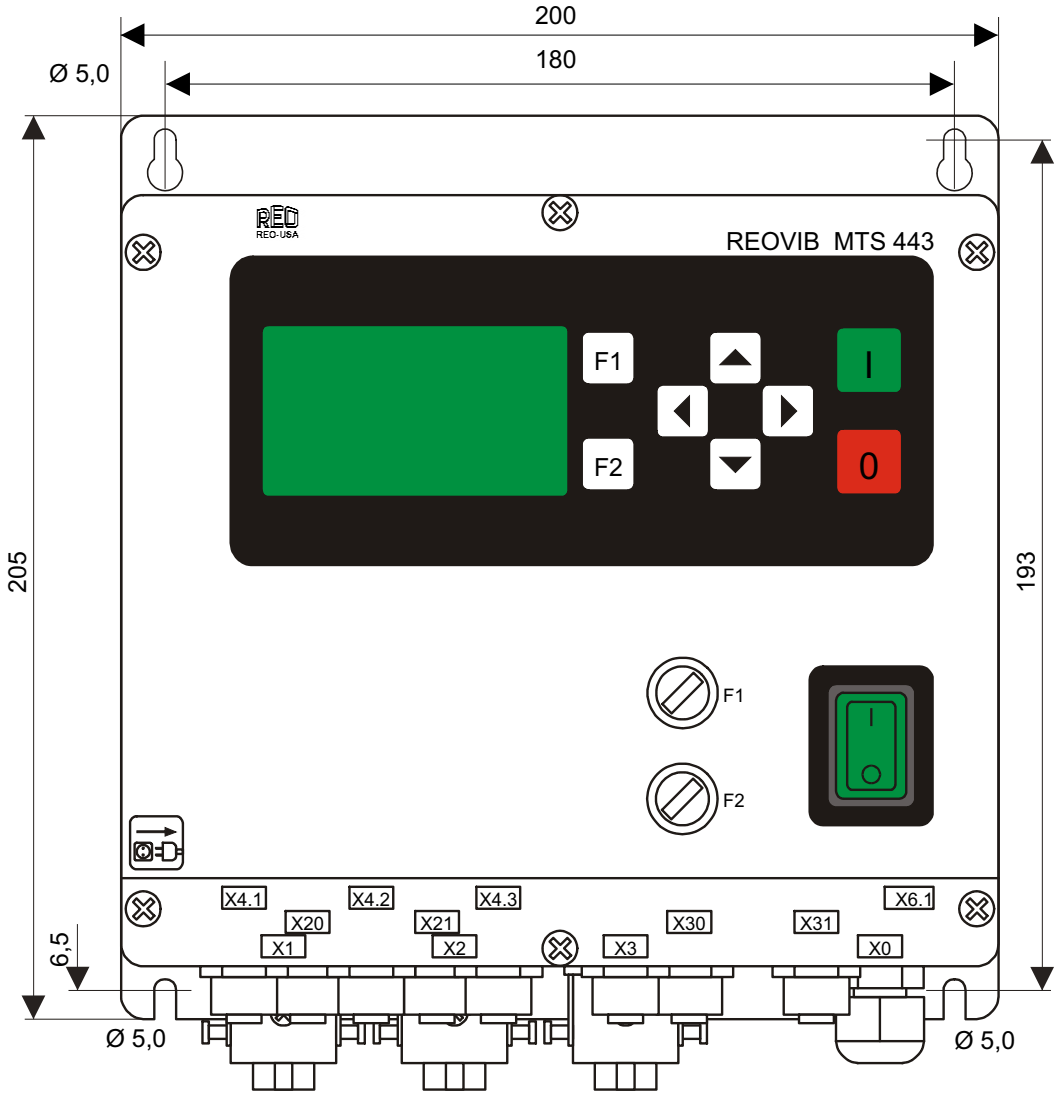
Connections:

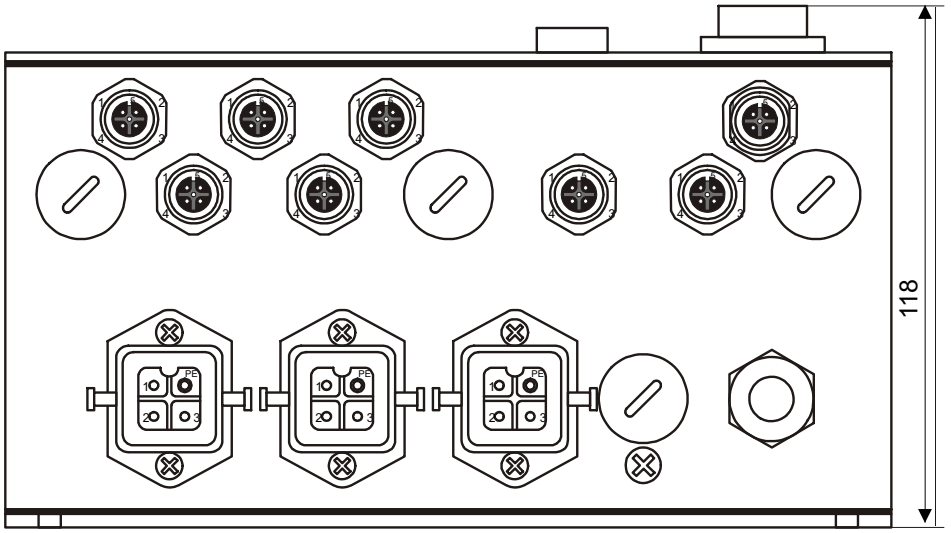
X 0	Mains Input	Cable or Socket, Type Han 3+PE
X 1	Bowl Feeder	Han 3+PE
X 2	Hopper Feeder	Han 3+PE
X 3	Linear Feeder	Han 3+PE
X 4.1	Sensor 1	M 12, 4 pin.
X 4.2	Sensor 2	M 12, 4 pin.
X 4.3	Sensor 3	M 12, 4 pin.
X 6.1	Enable / Status	M 12, 4 pin.
X 20	24 V Output 1	M 12, 4 pin.
X 21	24 V Output 2	M 12, 4 pin.
X 30	Time out Track	M 12, 4 pin.
X 31	Time out Hopper	M 12, 4 pin.

Information for Connectors

X0	HA-4-M-F / 090218
X1, X2, X3	HA-4-M / 090212
X4.1, X4.2, X4.3 X6.1, X20, X21 X30, X 31	RSV-M-12-4 / 090131

Dimensions:[mm]





Service:

Key Numbers for Special Settings:

By using special 'Key' numbers the end user can be prevented from accessing functions

Hide Parameter Menus: 0117
Hide Setpoint: 0137

0117 Hide Parameter Menu:
Select "Service" function group
Select "Key" function group
Using the UP/DOWN cursor keys set 0117 (Characters are in Hex Code 0...F)
Next using the RIGHT cursor key set CLOSE to '1'
All menus relating to throughput, info and service are no longer available

0137 Close setpoint:
Select "Service" function group.
Select "Key" using the UP/DOWN cursor keys set 0137(Characters are in Hex Code 0...F)
Next using the RIGHT cursor key set CLOSE to '1'
The Throughput menu is no longer accessible

The Key numbers are independent of each other and so both keys must be used if all parameters and the setpoint are to be closed

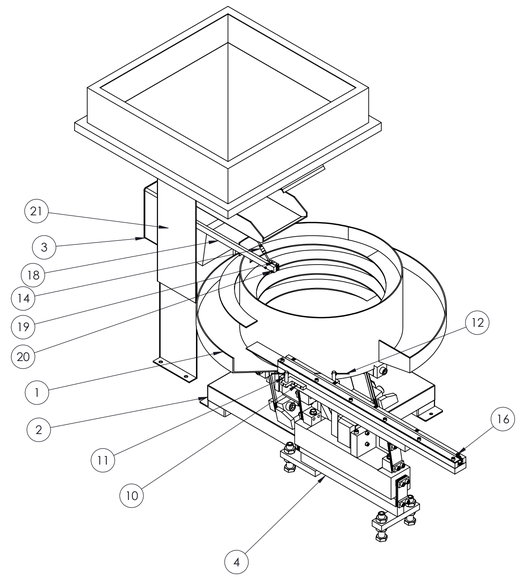
Gil Garcia - Vice President
gil@reo-usa.com
Phone (317) 899-1395
Fax (317) 899-1396

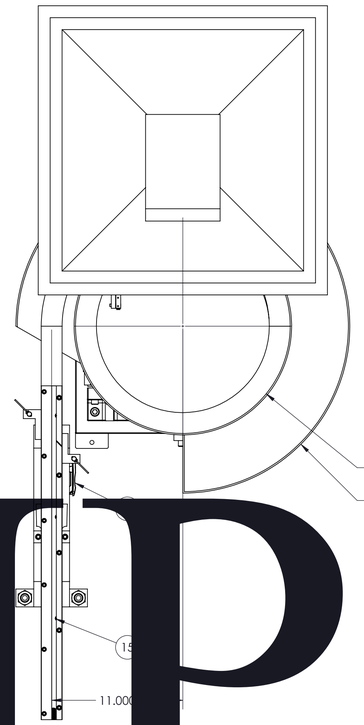
ITEM NO.	PART NUMBER	DESCRIPTION	STOCK SIZE	Material	QTY.
1	2678-A 18IN. CCW FEEDER BOWL	18" FEEDER BOWL	MFS CUSTOM	304 STNLS	1
2	18-CCW-BASE-DRIVE	18" CCW BASE DRIVE, 115 V	J & J ENG	PURCHASED	1
3	FEEDER CONTROLLER	REO-MTS-443-15A 230 V	REO USA	PURCHASED	1
4	2678-A-S-I-18 INLINE	115 V 18" INLINE	J & J ENG	PURCHASED	1
5	2678-A DETAIL 1	TRACK BASE	.75 X 1.75 X 28.00	304-TRU-BAR	1
6	2678-A DETAIL 2	RH SIDE GUIDE	.48 X .73 X 28.00	304-TRU-BAR	1
7	2678-A DETAIL 3	LH SIDE GUIDE	.48 X .73 X 28.00	304-TRU-BAR	1
9	2203639-G	CUSTOMER'S PART	X X	PLASTIC	1
9	2678-A DETAIL 4	TOP CONFINEMANT	11 GA. X .88 X 28.00	304-SHEET	1
10	MFS-0001-M	PE BRACKET	.38 X 1.50 X 2.50	6061-ALUM	2
11	MFS-0004-M	POST FOR PIT43TMB5	.38 Ø X 2.00	6061-ALUM	2
12	FU-77G	FIBER SET	KEYENCE	PURCHASED	1
13	FS-N11CP	KEYENCE NEO AMPLIFIER	KEYENCE	PURCHASED	1
14	OP-73864	M8 CONNECTOR 2m LONG	KEYENCE	PURCHASED	2
15	1/4-20 X 1 3/8" S.H.C.S.	TRACK BASE TO DRIVE BAR		STOCK	6
16	1/4-28 X 1 1/8" S.H.C.S.	SIDE GUIDE TO TRACK BASE		STOCK	10
17	1/4-28 X 1/2" S.H.C.S.	TOP CONFINEMENT TO SIDE GUIDE		STOCK	6
18	2678-A DETAIL 5	HOPPER ARM	.38 X .75 X 17.00	CRS	1
19	PZ-V32P	BOWL LEVEL SENSOR M8 QD	KEYENCE	PURCHASED	1
20	M3 X 0.5 X 16 S.H.C.S.	BOWL LEVEL SENSOR TO HOPPER ARM		STOCK	2
21	XLP 7 3 CU FT (8IN. EXT.)	3 CU FT HOPPER	SERVICE ENG.	PURCHASED	1

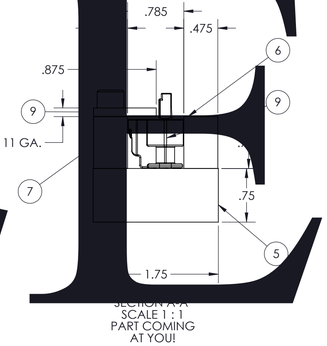
SYSTEM OVERVIEW:

- PART NAME: 4P HOUSING
- PART No. 2203639-G
- PART ORIENTATION: CENTRAL AXIS VERTICAL AND PERPENDICULAR TO TRAVEL, PARTS RIDING ON THE FLAT BASE, APPENDAGE ON SIDE OF PART AWAY FROM BOWL CENTER, OPEN SIDE UP. DISCHARGED HORIZONTALLY. BUILT WITH NO BACK PRESSURE RELIEF.
- FEED RATE: 50 P.P.M.
- BOWL ROTATION: COUNTER CLOCKWISE
- 18" BASIC BOWL SIZE:
- 28" MAX. O.D. OF BOWL RETURN PAN.
- BOWL COATING: NONE
- 27.5" INLINE TRACK.
- TRACK MATERIAL: 304 STAINLESS STEEL
- PHOTO CELL HIGH LEVEL SHUT OFF. KEYENCE
- 3 CU. FT. COLD ROLLER STEEL STD. STORAGE HOPPER.
- BOWL LEVEL SENSOR. KEYENCE
- SYSTEM VOLTAGE 115 VAC 60 Hz 1 Ph. REO-MTS-443 CONTROLLER
- SYSTEM PAINT COLOR: MFS BLUE

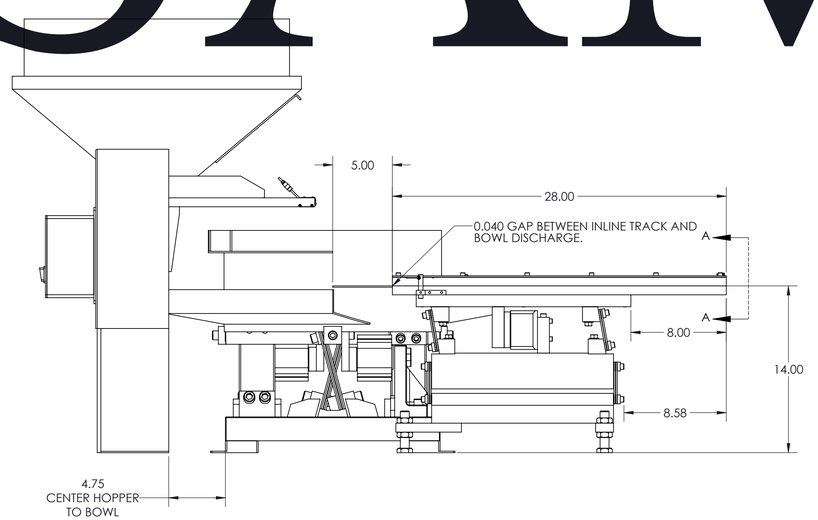
PLEASE NOTE: UNLESS OTHERWISE SPECIFIED THIS FEED SYSTEM WILL BE MANUFACTURED TO MILLER'S [illegible] STANDARDS.

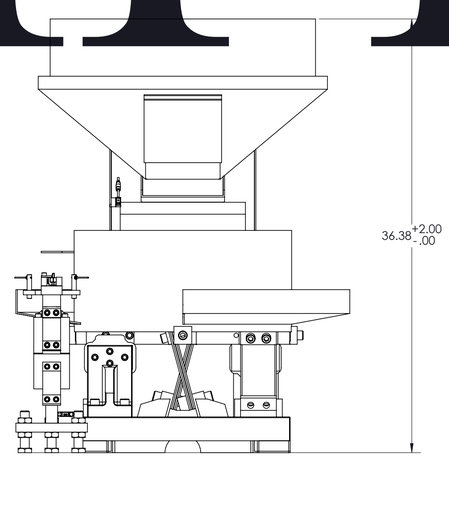






SECTION A-A
SCALE 1 : 1
PART COMING AT YOU!





Miller's Feeding Solutions, INC.
10721 75th. Street North
Largo, FL 33777-1437
727-541-5763

DATE 12/02/13	DRW BY *J. Clark*	Tolerence Unless Otherwise Specified .XXX ± .005 .XX ± .010 X ± .030 ANGLES ± 1/2° **DO NOT SCALE DRAWING**
CUSTOMER X		SCALE: 1:6 And As Noted
TITLE X		MFS JOB NUMBER
FILE NAME 2678-A MAIN LAYOUT-SAMPLE		2678-A

RELEASED
DATE_____ BY_____

KEYENCE

96M11513

96M11513-1

Digital Fiber Sensor

FS-N10 Series

Instruction Manual

Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be used at any time.

⚠Danger	**Failure to follow these instructions may lead to death or serious injury.**
⚠Warning	**Failure to follow these instructions may lead to injury.**
⚠Caution	**Failure to follow these instructions may lead to product damage (product malfunction, etc.)**

Note Provides additional information on proper operation.

Tip This provides useful tips for the feature being described.

See "FS-N10 Series User's Manual" for details on the features of the FS-N10 Series and detailed instructions for configuration.

Hints on Correct Use

⚠Warning	• **This product is just intended to detect the object(s). Do not use this product for the purpose to protect a human body or a part of human body.** • **This product is not intended for use as explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere.** • **This product uses DC power. Do not apply AC power. The product may explode or burn if an AC voltage is applied.**

- Do not wire the amplifier line along with power lines or high-tension lines, as the sensor may malfunction or be damaged due to noise.
- When using a commercially available switching regulator, ground the frame ground terminal and ground terminal.
- Do not use the FS Series outdoors, or in a place where extraneous light can enter the light-receiving element directly.
- Due to individual dispersion characteristics and the difference in fiber unit models, the maximum sensing distance or displayed value may not be the same on all units.
- If the sensor is used for a long time with the APC function enabled and the LED is imposed with a heavy load, the current consumption of the sensor for light emission will become constant and 'END APC' will be displayed. The sensor can still be used in this case. However, replace the sensor if even small changes in received light intensity should be detected for precise detection.

Precautions on Regulations and Standards

■ UL Certificate

This product is an UL/C-UL Listed product.
- UL File No. E301717
- Category NRKH,NRKH7
- Enclosure Type 1 (Based on UL50)

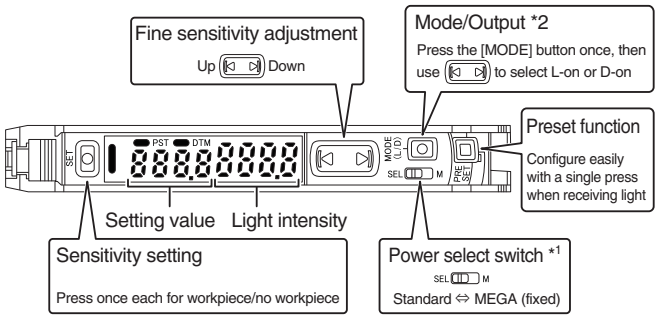
Be sure to consider the following specifications when using this product as an UL/C-UL Listed Product.
- Use the power supply with Class 2 output defined in NFPA70 (NEC: National Electrical Code).
- Power supply/ Control input/ Control output shall be connected to a single Class 2 source only.
- Use with the over current protection device which is rated 30V or more and not more than 1A.

Included accessories

- Instruction Manual 1pc.

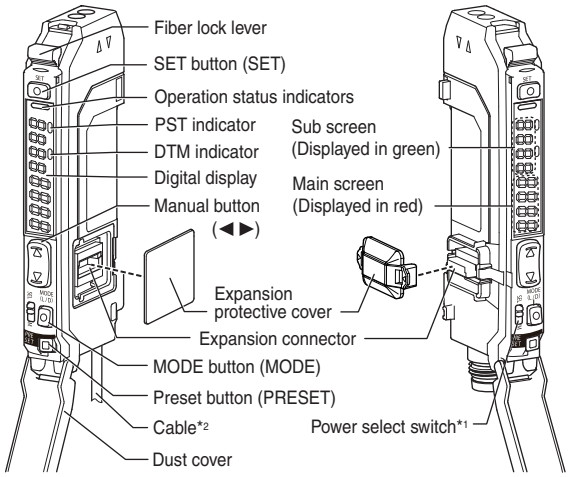
FS-N10 Series Quick Start

■ Quick Start



*1 This is a channel switch on 2-output types. This is not equipped with the 0-line type.
*2 Press and hold the [MODE] button to make advanced setting changes.

Names of Each Part of the Main Unit and Expansion Unit



*1 Setting to "M" locks the power mode to MEGA mode. The switch is a channel switch for the two output type. This is not equipped with the 0-line type.
*2 On the FS-N1□C□, this is an M8 connector rather than a cable. On the FS-N1□EN, this is an e-CON connector.

Mounting Unit

■ Mounting on a DIN Rail

1 **Align the claw at the bottom of the main body with the DIN rail, as shown in figure1.**
While pushing the main body in the direction of the arrow 1, push down in the direction of arrow 2.

2 **To dismount the sensor, raise the main body in the direction of the arrow 3 while pushing the main body in the direction of arrow 1.**

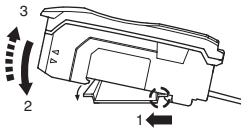


figure1

■ Installation on a Wall (Main Unit Only)

1 **Attach the unit to the optional mounting bracket (OP-73880), and secure with two M3 screws as shown in figure2.**

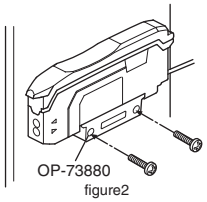


figure2

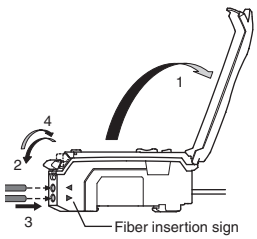
Connecting Fiber Unit

1 **Open the dust cover in the direction shown by arrow 1.**

2 **Move the fiber lock lever in the direction shown by arrow 2.**

3 **Insert a fiber unit into the amplifier as indicated by arrow 3 (approximately 14 mm).**

4 **Move the fiber lock lever in the direction shown by arrow 4 to secure the fiber.**

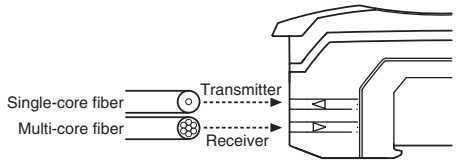


Note

- **If a thin fiber unit is used, an adapter provided with the thin fiber unit will be required.**
  Unless the correct adapter is connected, the thin fiber unit will be loose and not detect targets correctly (the adapter is supplied with the fiber unit).

Cable outer dia	Adapter	Appearance
ϕ1.3	Adapter A (OP-26500)	
ϕ1.0	Adapter B (OP-26501)	

- **To connect the coaxial reflective type fiber unit to the amplifier, connect the single-core fiber to the transmitter side, and connect the multiple-core fiber to the receiver side.**



Connecting Multiple Amplifiers

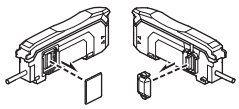
Up to 16 expansion units can be connected to one main unit. However, two output types will be treated as two main units.

⚠Warning	**Mount on DIN rail and install on metal surface when connecting to multiple amplifiers or mounting main units together.**

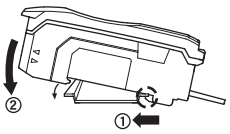
Note

- **When connecting with units other than N-bus (a general term for the KEYENCE wire-saving connection system) compatible sensor amplifiers, including the FS-N10 Series, and the network unit NU Series, consult your nearest KEYENCE dealer.**
- **Turn the power off before connecting multiple expansion units.**
- **Do not touch the expansion connector with your bare hands.**

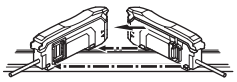
1 **Remove the protection covers from the main unit and expansion unit(s).**



2 **Install the amplifiers on the DIN rail one at a time.**

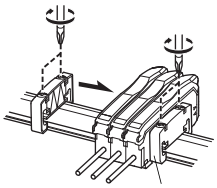


3 **Slide the main unit and expansion unit(s) together. Engage the two claws of the expansion unit with the recesses on the main unit side until you hear/feel a click.**



4 **Attach the end units (option: OP-26751) to the DIN rail in the same way as step (2).**

5 **Secure the amplifiers between the end units. Tighten the screws at the top (two screws x two units) with a Phillips screwdriver to fix the end units.**



OP-26751 (a set of two)

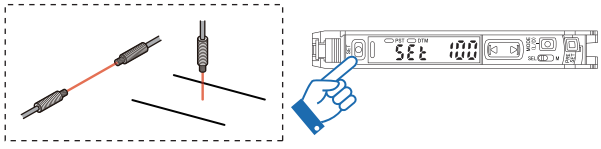
Calibration Method

■ Detecting Even Small Differences

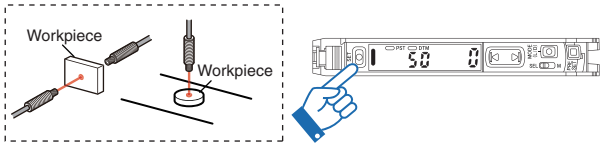
● Two-point Calibration

Two-point calibration is the basic method of calibration.
Press the [SET] button once without the workpiece, and then press it once again with the workpiece.

1 **Press the [SET] button with no workpiece.**
[SET] will be displayed on the sub-menu (green display).



2 **Press the [SET] button with workpiece.**
The values will be set and the submenu (green display) will flash. The values will be set to the mid-point between the light intensity when there is no workpiece, and the light intensity when there is a workpiece.



If "----" flashes for two seconds on the main screen, the light intensity is too small between conditions when the workpiece is absent and when it is present. These values will be set, but there is the possibility that detection may become unstable.

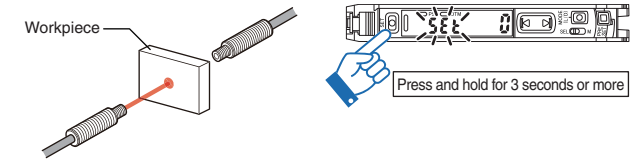
Other Calibration Methods

■ Increased Resistance to Dust and Dirt

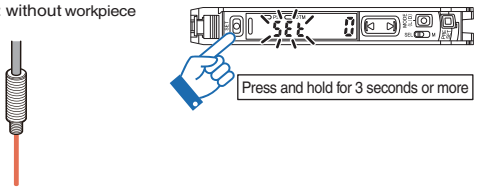
● Maximum Sensitivity Calibration

In the state shown below, press and hold the [SET] button for three seconds or more. Stop pushing when "SEt" flashes.
The sensitivity is set slightly higher than the received light intensity.

Thrubeam model : with workpiece



Reflective model : without workpiece

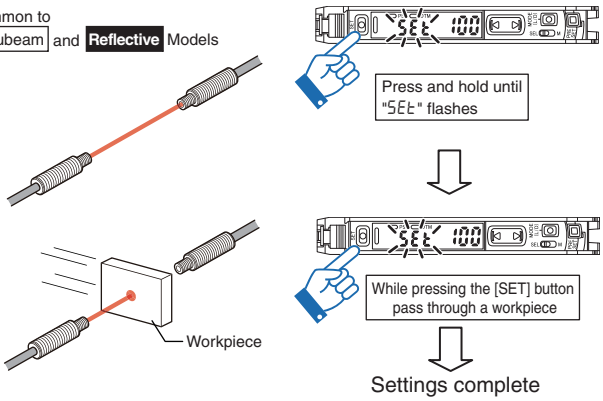


■ Calibrate with a Moving Workpiece

● Fully Automatic Calibration

Press and hold the [SET] button with no workpiece in place. While "SEt" is flashing, pass a workpiece through. (Continue pressing the [SET] button while the workpiece passes through.)

Common to Thrubeam and **Reflective** Models

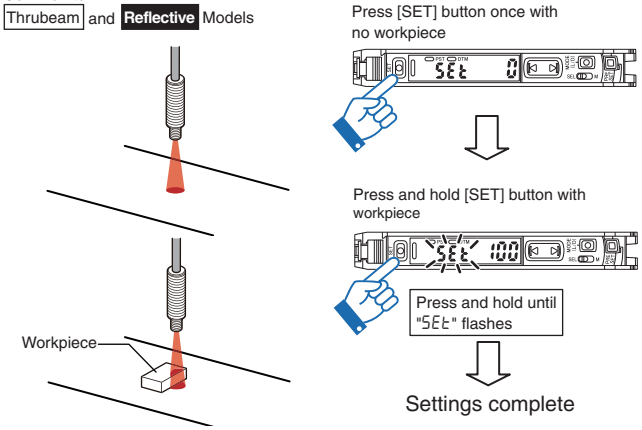


■ Position Workpiece

● Positioning Calibration

Press the [SET] button with no workpiece.
Place the workpiece in the location you wish to position it. Press and hold the [SET] button for at least 3 seconds. Release the button when "SEt" flashes.

Common to Thrubeam and **Reflective** Models



Simple, User Friendly Functions

■ Setting the Current Value to 100.0

With the FS-N10 Series, you can set the current value to 100.0 using simple operations. Standardizing the current value makes it possible for the sensor amplifiers to instantly differentiate reductions in light intensity and is useful in predicting the need for maintenance.

Note

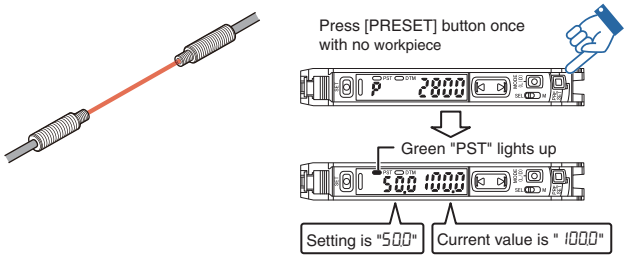
- **The various Preset functions listed below cannot be used when the Zero-Shift function is enabled. Disable the Zero-Shift function before executing the following functions.**
- **The Preset functions are not suited for transparent workpieces and other cases of detection with low light intensity differences.**

Tip

You can disable various Preset functions by pressing and holding the [PRESET] button.

Preset Function

This function adjusts the current value to "1000".
With light received, press the [PRESET] button. The current value is set to "1000".



Pressing the [PRESET] button changes the setting and current value as shown below.

- **Presetting with preset disabled:**
  The setting is changed to "500". The setting can be changed via the normal calibration method.
- **Presetting with preset enabled:**
  Only the current value is changed to "1000", and the setting is not changed.

Tip

Handy Uses for the Preset Function

This function is most useful when performing simple detection using a thru-beam model fiber unit (e.g. completely blocked detection, such as when all light axes of the fiber unit are interrupted by opaque workpieces).

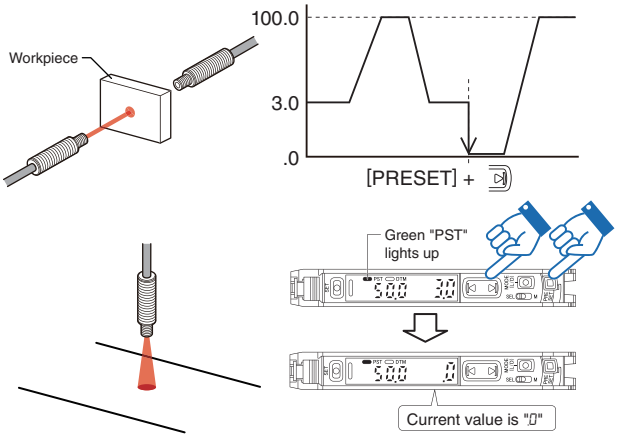
Work-Preset Function

This function adjusts the current value to "0".
After executing the Preset function in a condition in which you would like "1000" to be displayed, executing this function in a condition in which you would like "0" to be displayed, will adjust any two points to "1000" and "0".

▶ Important

The Work-Preset function can be used while the Preset function is in use (when Preset is enabled).

Pressing the [PRESET] button and the ⊳| button at the same time will set the current value at that time to "0". Values that have been set to "1000" with the Preset function cannot be changed.



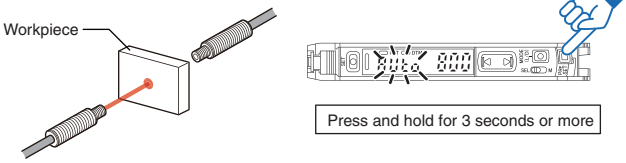
Tip

When using this function with reflective models, "1000" will be displayed when there is a workpiece, and "0" will be displayed when there is no workpiece, making it easy to know when the workpiece is present or absent. Additionally, even when with a reflective model, the background has higher light intensity than the workpiece, if you set a condition with low light intensity to "1000" using the Preset function and then using the Work-Preset function, register a condition with high light intensity as "0", the background will display as "0" and when the workpiece is present, it will be displayed as "1000".

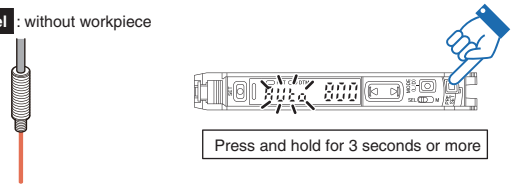
Maximum Sensitivity Preset Function

This function sets conditions that will serve as reference, to "0" and adjusts conditions with slightly high light intensity as "1000". This is useful when you would like to perform detection using the background as a reference with reflective models.
In the following conditions, press and hold the [PRESET] button for 3 seconds or more then release your finger when "Auto" is flashed.

Thrubeam model : with workpiece



Reflective model : without workpiece



- The maximum value for the light intensity while the [PRESET] button is being pressed is set to "0", and light-intensity that is slightly higher than the maximum value at that time will be adjusted to "1000".
- The setting value is "500"
- The green [PST] indicator will light up.

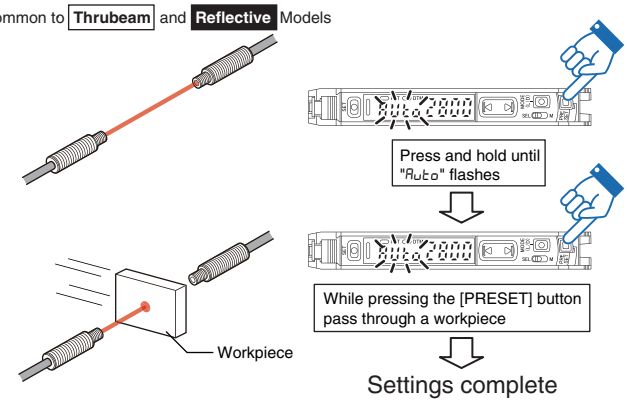
Note

Cannot be executed when the Preset function is already being used (when the [PST] indicator is flashing). Press and hold the [PRESET] button to disable the Preset function before executing this function.

Full Auto Preset Function

This function automatically differentiates between two conditions (presence/absence of workpiece) and adjusts the current values to "1000" and "0". This is effective for cases when the workpiece is moving at high-speed.
Press and hold the [PRESET] button with no workpiece in place. While "Auto" is flashing, pass a workpiece through. (Continue pressing the [PRESET] button while the workpiece passes through.)

Common to **Thrubeam** and **Reflective** Models



- Near-maximum values while the [PRESET] button is being pressed and held are adjusted to "1000" and near-minimum values are adjusted to "0" .
- The setting value is changed to "500"
- The green [PST] indicator will light up.

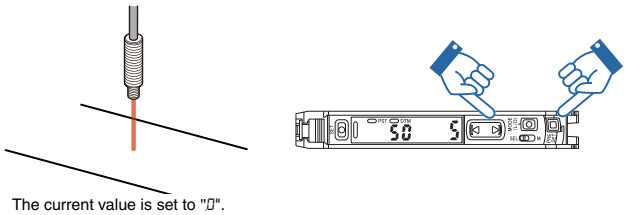
Note

Cannot be executed when the Preset function is already being used (when the [PST] indicator is flashing). Press and hold the [PRESET] button to disable the Preset function before executing this function.

Set Current Value to "0"

The Zero Shift Function

This function is primarily used with reflective models.
Press the [PRESET] button and ⊳| button at the same time.



- The current value is set to "0".
- Green "PST" lights up

Note

The zero shift and preset function cannot be used together. To use the preset function, you must first disable the zero shift function.

Disable the Zero Shift Function

Press and hold the [PRESET] button to disable the zero shift function.

Tip

Handy Uses for the Zero Shift Function

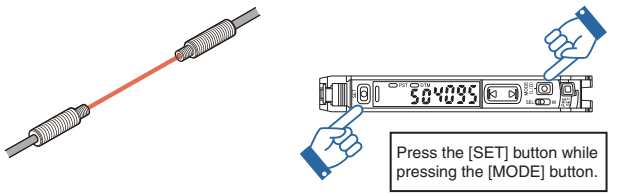
This function is primarily used to set the current value to "0" on a reflective model fiber unit.

When a reflective model is first installed, the light intensity is sometimes not set to "0".
If this happens, using the zero shift function to set the value to "0" when there is no workpiece allows for easier understanding of the difference in light intensity.

Adjusting the current intensity value when it is too large (when saturated).

Use the Saturation Recovery Function

Press the [SET] button while pressing the [MODE] button.



After adjusting the light transmission level and light intensity sensitivity, the current values will be adjusted to within the ranges listed in the table that follows.

Power mode	Light intensity setting range
HSP*, FINE, TURBO	2047 ± 350
SUPER	4095 ± 500
ULTRA, MEGA	5000 ± 600

*HIGH SPEED

Disable Saturation Recovery

When the saturation recovery function is enabled, press the [SET] button while pressing the [MODE] button to cancel it.

Tip

Handy Uses for the Saturation Recovery Function

This function is useful when the intensity value is saturated after installation. This function corrects the saturation via a simple operation, by automatically calibrating the light transmission level and light intensity gain.

Output Switch

Either light-ON (L-on) mode or dark-ON (D-on) mode can be selected.

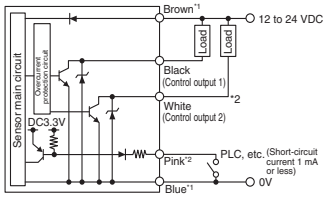
1 While the current value is displayed, press the [MODE] button once.

2 Use [◁ ▷] to switch the output (L-on/d-on), then press the [MODE] button again. The output change completes, and the display returns to the current value.

Connecting to External Devices

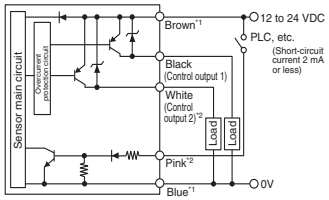
■ Cable Types

FS-N11N/N12N/N13N/N14N



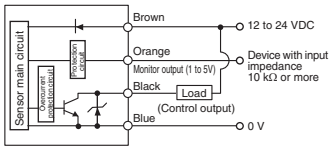
*1 FS-N11N/N13N only
*2 FS-N13N/N14N only

FS-N11P/N12P/N13P/N14P



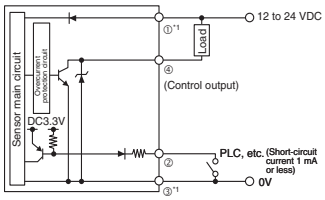
*1 FS-N11P/N13P only
*2 FS-N13P/N14P only

FS-N11MN



■ M8/e-CON Connector Types

FS-N11CN/N12CN/N11EN/N12EN

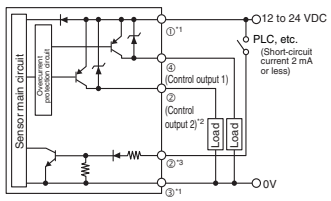


*1 FS-N11CN/N11EN only

M8 connector Pin layout
FS-N11CN/N12CN

e-CON connector Pin layout
FS-N11EN/N12EN

FS-N11CP/N12CP/N13CP/N14CP



*1 FS-N11CP/N13CP only
*2 FS-N13CP/N14CP only
*3 FS-N11CP/N12CP only

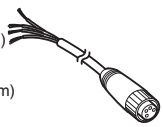
M8 connector Pin layout

■ M8 connector Cable (Sold Separately)

For FS-N11CN/N11CP/N12CN/N12CP/N13CP/N14CP

OP-73864
(Cable length: 2 m)

OP-73865
(Cable length: 10 m)



Pin - Pin and wire color table

Connected pin No.	Wire color
1	Brown
2	White
3	Blue
4	Black

Error Displays and Corrective Actions

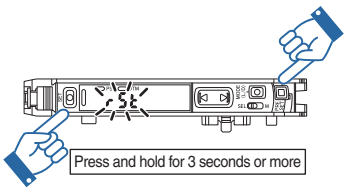
Error display	Cause	Solution
ErC	Overcurrent in the control output.	Check the load and return the current within the rated value.
ErE	Failed to write/load the internal data.	Perform initialization (p.4).
End APC	Large load on the light source.	Replace the sensor if highly precise detection is required.
Loc	The keylock function is ON.	For disabling (setting) method, see "FS-N10 Series User's Manual".

Consult your nearest KEYENCE office regarding error displays other than the ones listed above.

Initializing the Settings

■ Initialization Method

1 Press and hold the [SET] and [PRESET] buttons simultaneously for three seconds.



2 Use the [◁ ▷] to select "rSt", then press the [MODE] button.

3 Use the [◁ ▷] to select "ini", then press the [MODE] button.
After initialization is complete, the display returns to the current value.

● Initial Settings

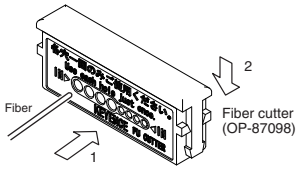
Setting	Initial Value
Power mode	FINE
Detection mode	Std (Normal)
Setting value	50
Output switch	L-on

Using a Fiber Cutter and Cautions for Use

■ Using a Fiber Cutter

1 Insert the fiber into the cutter hole.

2 Bring down the blade in a single, swift motion to cut the fiber.



Always insert fiber from the side with writing

■ Cautions for Using a Fiber Cutter

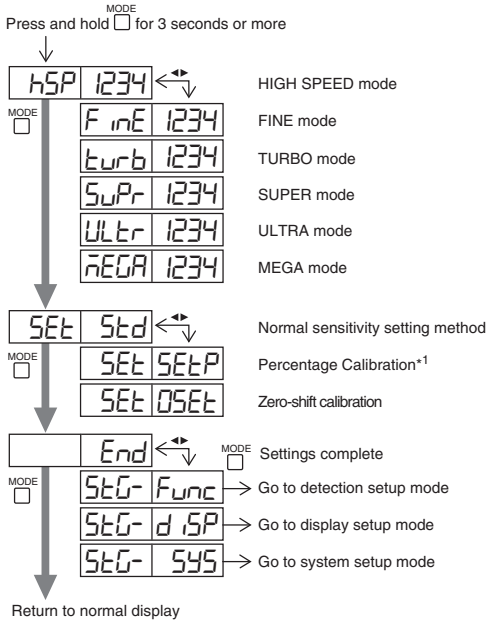
- The fiber cutter comes with the fiber unit.

Failure to follow the cautions below could reduce the detection range.

- When cutting a fiber unit to be attached to the FS-N10 Series, be sure to use a gray fiber cutter (OP-87098)
- Stopping the blade midway could cause a bad cut plane, reducing the detection range.
- Do not use the same hole twice.

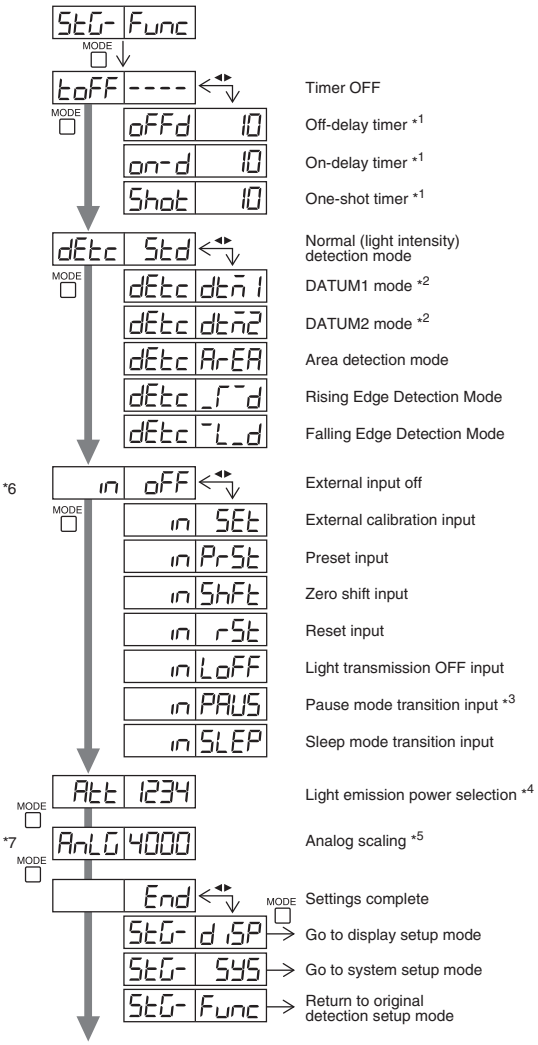
Function Configuration

■ Basic Setting



*1 You can press the MODE button to set between the range of -99P to 99P.

■ Detection Settings



*1 Press the MODE button to set between the range of 1 and 9999(ms).

*2 Press the MODE button to set the retouch sensitivity to a range of between LEv 1 and LEv3 and set the warning output level to a range of between 0P and 100P.

*3 Press the MODE button to toggle between oFF/on/tEEP.

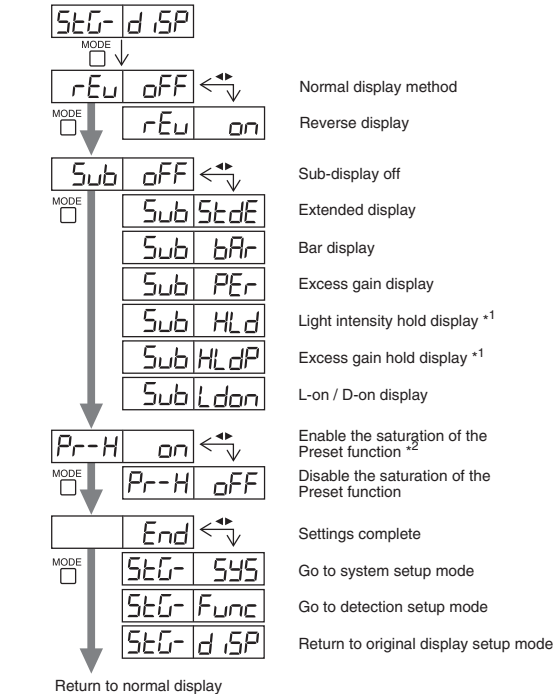
*4 Can be set between the range of 1 and 100.

*5 Can be set between the range of 100 and 9999.

*6 Can be used only for the types with the external input.
Note that these functions can be used via communication when connecting with the network unit NU Series.

*7 Only monitor output types (FS-N11MN).

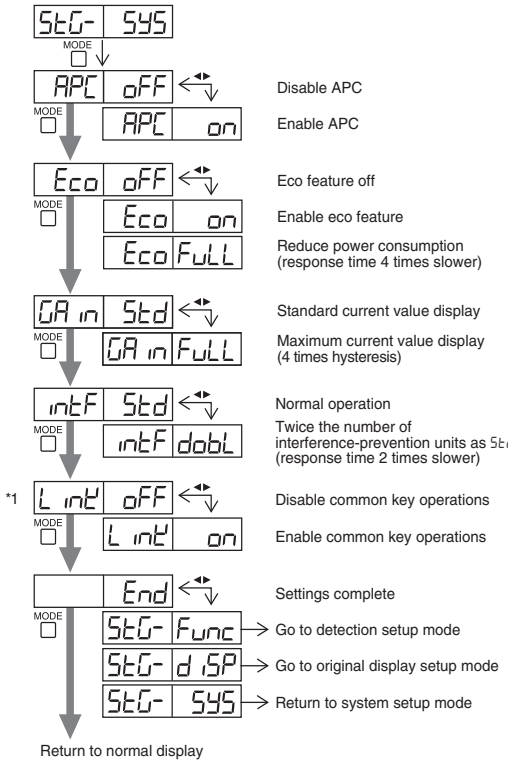
■ Display Settings



*1 Press the MODE button to toggle between Std/P-P_/b-b_/P_b-/P-b_

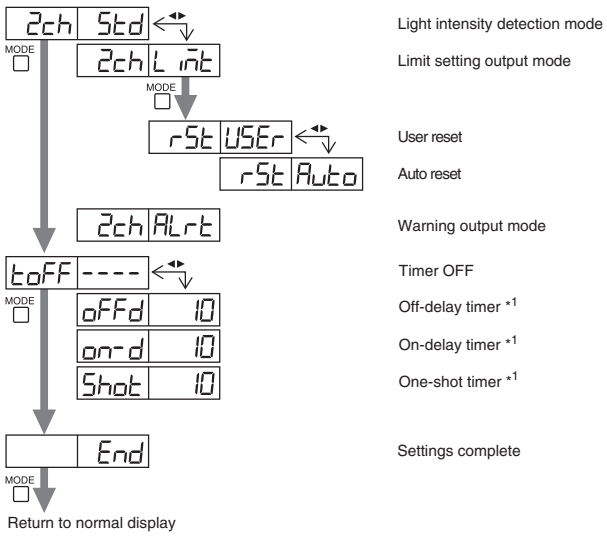
*2 Press the MODE button to set between the range of 100P and 200P.

■ System Settings



*1 Main unit only.

■ Two Output *2



*1 Press the MODE button to set between the range of 1 and 9999(ms).

*2 Only 2 output types (FS-N13N/N13P/N14N/N14P/N13CP/N14CP).

Specifications

Type		Standard 1 output						High functionality 2 output				Monitor output	0-line
Cable/M8 connector		Cable		M8 connector[*1]		e-CON connector[*1]		Cable		M8 connector[*1]		Cable	-
Main unit/expansion unit		Main unit	Expansion unit (with output cable)	Main unit	Expansion unit (with output cable)	Main unit	Expansion unit (with output cable)	Main unit	Expansion unit (with output cable)	Main unit	Expansion unit (with output cable)	Main unit	Expansion unit (without output cable)
Model	NPN	FS-N11N	FS-N12N	FS-N11CN	FS-N12CN	FS-N11EN	FS-N12EN	FS-N13N	FS-N14N	-	-	FS-N11MN	FS-N10
	PNP	FS-N11P	FS-N12P	FS-N11CP	FS-N12CP	-	-	FS-N13P	FS-N14P	FS-N13CP	FS-N14CP	-	
Control output		1 output	1 output	1 output	1 output	1 output	1 output	2 output	2 output	2 output	2 output	1 output	N/A[*2]
Monitor output (1 to 5 V)		-	-	-	-	-	-	-	-	-	-	1 output	-
External input		-	-	1 input	1 input	1 input	1 input	1 input	1 input	-	-	-	-
Light source LED		Red 4-element LED (wavelength 630 nm)											
Response time		50 μs (HIGH SPEED)/250 μs (FINE)/500 μs (TURBO)/1 ms (SUPER)/4 ms (ULTRA)/16 ms (MEGA)											
Output toggle		Light-ON/dark-ON toggle											
Timer function		Timer OFF, OFF delay, ON delay, One-shot											
Control output	NPN output	NPN open collector 24 V; 1 output max: 100 mA or less; 2 output total: 100 mA or less (used stand-alone)/20 mA or less (multiple connections); residual voltage 1 V or less											
	PNP output	PNP open collector 24 V; 1 output max: 100 mA or less; 2 output total: 100 mA or less (used stand-alone)/20 mA or less (multiple connections); residual voltage 1 V or less											
Monitor output[*3]		1 to 5 V voltage output; load resistance 10 kΩ or more; repeat precision ± 0.5% of F.S.; 1 ms response time (HIGH SPEED, FINE, TURBO)[*4]											
External input		input time 2 ms (ON)/20 ms (OFF) or more[*5]											
Expansion Units		Up to 16 units can be connected (total of 17 units including the main unit). Note that the two-output type is counted as two units.											
Protection circuit		Protection against reverse power connection, output overcurrent, and output surge											
Number of interference prevention units		0 for HIGH SPEED; 4 for FINE; 8 for TURBO/SUPER/ULTRA/MEGA (When set to double, the number of interference-prevention units will be doubled.)											
Rating	Power voltage	12 to 24 V DC ± 10% ripple (P-P) 10% or less											
	NPN	Normal:900 mW or less (36 mA max. at 24 V, 48 mA max. at 12 V)[*6] Eco on mode:800 mW or less (32 mA max. at 24 V, 39 mA max. at 12 V)[*6] Eco Full mode:470 mW or less (19 mA max. at 24 V, 23 mA max. at 12 V)											
	PNP	Normal : 950 mW or less (39 mA max. at 24 V, 52 mA max. at 12 V)[*6] Eco on mode : 850 mW or less (35 mA max. at 24 V, 44 mA max. at 12 V)[*6] Eco Full mode : 520 mW or less (21 mA max. at 24 V, 26 mA max. at 12 V)						Normal : 1050 mW or less (42 mA max. at 24 V, 56 mA max. at 12 V)[*6] Eco on mode : 950 mW or less (38 mA max. at 24 V, 47 mA max. at 12 V)[*6] Eco Full mode : 600 mW or less (24 mA max. at 24 V, 29 mA max. at 12 V)				-	
Environmental resistance	Operating ambient luminance	Incandescent lamp: 20,000 lx or less; Sunlight: 30,000 lx or less											
	Operating ambient temperature	-20 to +55 °C (no freezing)[*7]											
	Operating ambient humidity	35 to 85% RH (no condensation)											
	Vibration resistance	10 to 55 Hz Compound amplitude 1.5 mm, 2 hours for each of X,Y,Z axis											
	Shock resistance	500 m/s^2 3 times for each of X,Y,Z axis											
Case material		Both main unit and expansion unit housing material: Polycarbonate											
Case dimensions		H30.3mm x W9.8mm x L71.8mm											
Weight		Approx 75g	Approx 45g	Approx 22g	Approx 22g	Approx 22g	Approx 22g	Approx 80g	Approx 70g	Approx 22g	Approx 22g	Approx 75g	Approx 20g

*1 Use a cable length of 30 m or less for M8 connector and e-CON connector types.
*2 Counted as 1 output when connecting with the network unit NU Series.
*3 FS-N11MN only
*4 SUPER : 1.2 ms, ULTRA : 1.8ms, MEGA : 4.2 ms
*5 Input time is 25 ms (ON)/25 ms (OFF) only when external calibration input is selected.
*6 Increases 100 mW (4.0 mA) for High Speed mode
*7 One or two more units connected: -20 to +55°C; 3 to 10 more units connected: -20 to +50°C; 11 to 16 more units connected: -20 to +45°C. When using 2-outputs, one unit is counted as two units. All temperature regulations are for when the unit is mounted on a DIN rail and installed on metal sheeting.

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KEYENCE CORPORATION

1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku,
Osaka, 533-8555, Japan
PHONE: +81-6-6379-2211

www.keyence.com

AUSTRIA
Phone: +43-2236-378266-0
BELGIUM
Phone: +32 1 528 12 22
CANADA
Phone: +1-905-696-9970
CHINA
Phone: +86-21-68757500
CZECH REPUBLIC
Phone: +420 222 191 483
FRANCE
Phone: +33 1 56 37 78 00
GERMANY
Phone: +49-6102-36 89-0
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Phone: +852-3104-1010
HUNGARY
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Phone: +31 40 20 66 100
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TAIWAN
Phone: +886-2-2718-8700
THAILAND
Phone: +66-2-369-2777
UK & IRELAND
Phone: +44-1908-696900
USA
Phone: +1-201-930-0100

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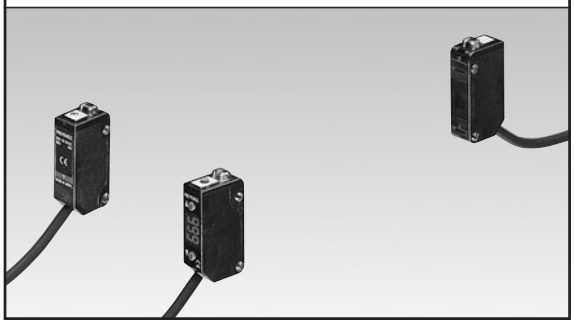
96M11228

* 9 6 M 1 1 2 2 8 - 1 *

Self-contained Photoelectric Sensor
PZ-V/PZ-M

Instruction Manual



Read this manual before using the product in order to achieve maximum performance.
Keep this manual in a safe place after reading it so that it can be used at any time.

Precautions on Regulations and Standards

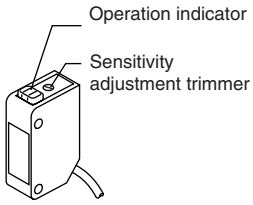
■ UL Certificate

This product is an UL/C-UL Listed product.
- UL File No. E301717
- Category NRKH,NRKH7
- Enclosure Type 1 (Based on UL50)

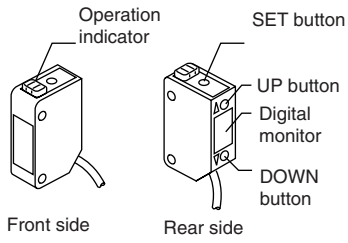
Be sure to consider the following specifications when using this product as an UL/C-UL Listed Product.
- Use the power supply with Class 2 output defined in NFPA70 (NEC: National Electrical Code).
- Power supply/ Control input/ Control output circuits shall be connected to a single Class 2 source only.
- Use with the over current protection device which is rated 24V or more and not more than 2A.

Part Names

PZ-M



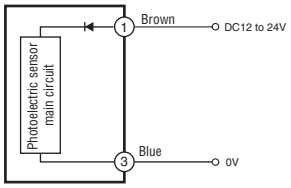
PZ-V



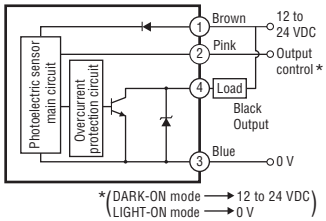
I/O Circuit

Circled numbers 1 to 4 represent the connector pin numbers.

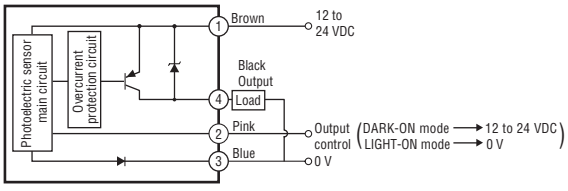
PZ-M51(P) (Transmitter)



PZ-M51(Receiver)/M61/M11/M31/V11/V31



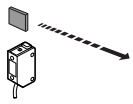
PZ-M51P (Receiver)/M61P/M11P/M31P/V11P/V31P



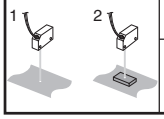
Sensitivity Adjustment

■ PZ-V (Digital type)

● Detect a moving target (Fully-automatic calibration)

Operation	Procedure	Adjustment
	1	Pass a target through the optical axis while pressing the SET button.
	2	Confirm that " SEt " flashes on the monitor.
	3	Release the SET button. The preset value flashes several times before the normal display appears.

● To detect a stationary target (Two-point calibration)

Operation	Procedure	Adjustment
	1	With no target, press the SET button and release it. " SEt " and the current distance flash alternately.
	2	With the target in place, press and release the SET button. The preset value flashes several times before the normal display appears.

● To obtain maximum sensitivity (Maximum sensitivity setting)

Operation	Procedure	Adjustment
	1	With no target, press the SET button for three seconds or more.
	2	Confirm that " SEt " flashes on the monitor.
	3	Release the SET button. The preset value flashes several times before the normal display appears.

Note: If the green LED turns off or " - - - " flashes after the calibration, the sensitivity has no allowance. In such a case, adjust the sensor head position, and calibrate again.

● Fine sensitivity adjustment
- When the ◁ or ▷ button is pressed and released, the numerical value flashes (approx. 2 seconds). This is the preset value. If the ◁ or ▷ button is pressed again while the preset value flashes, the preset value can be increased or decreased.
- When the ◁ or ▷ button is held down for 3 seconds or more, the preset value increases/ decreases continuously.

●Other functions

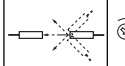
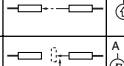
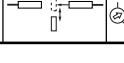
Function	Operation	Description	Display
Display selection	Press the ◁ and ▷ buttons simultaneously and release them.	Change the display as shown on the right	ON OFF 123 ↔ --- - Distance display / ON/OFF display
Key-lock	Press the ◁ and ▷ buttons simultaneously for three seconds or more.	Lock the operation buttons to avoid the preset value from being accidentally changed.	Loc flashes and then the normal display appears.
Key-lock cancel	Press the ◁ and ▷ buttons simultaneously for three seconds or more.	Unlock the operation buttons to allow the preset value to be changed.	unL flashes and then the normal display appears.

■ Distance display
- The greater the distance between the target and the sensor head, the larger the displayed value becomes.
- If the target or background is out of the detectable range, is 999 displayed.

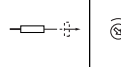
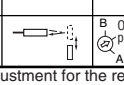
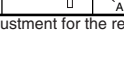
Note 1: The distance value indicates a reference value only. It is not an absolute distance.
Note 2: If the target approaches the sensor head closer than the specified range, the displayed value may increase.

■ PZ-M (Trimmer type)

• DARK-ON mode (When LIGHT-ON mode is selected, refer to the description in parentheses.)

	Procedure	Operation	Trimmer	Indicators	Adjustment
Thrubeam type	1		 Max.	Green ☼ (☼) Orange ● (☼)	With the target in place, turn the trimmer to "Max." With the receiver in place, move the transmitter up/down and right/left. Set the transmitter at the midpoint of the range where the green LED is lit. Secure the transmitter and adjust the receiver position in the same way.
	2		 A Max.	Green ● (●) Orange ● (☼)	Turn the trimmer counterclockwise from Max. until the green LED turns off. Assume the position as Point A.
	3		 A Optimal position Max.	Green ☼ (☼) Orange ● (☼)	Set the trimmer midway between point A and Max. Confirm sensor operation.

• LIGHT-ON mode (When DARK-ON mode is selected, refer to the description in parentheses.)

	Procedure	Operation	Trimmer	Indicators	Adjustment
Multi-reflective type	1		 A	Green ● (●) Orange ☼ (●)	With no target, turn the trimmer clockwise until the orange indicator illuminates (turns off) and assume the position as Point A. If the LED does not illuminate (turn off) even with the trimmer at Max., use Max. as Point A.
	2		 A	Green ● (●) Orange ☼ (●)	With the target in place, turn the trimmer counterclockwise from Point A until the green LED turns off. Assume the position as Point B.
	3		 B Optimal position A	Green ☼ (☼) Orange ☼ (●)	Set the trimmer midway between points A and B. Confirm sensor operation.

* The adjustment for the retroreflective type is the same as for the thrubeam type.

Specifications

Type	Thrubeam	Retroreflective	Multi-reflective					
Model	**PZ-M51**	**PZ-M61** [1.]	**PZ-M11** [1.]	**PZ-M31** [1.]	**PZ-M71** [1.]	**PZ-V11** [1.]	**PZ-V31** [1.]	**PZ-V71** [1.]
Detecting distance [2.]	10 m	0.1 to 1.5 m (When R-5 reflector is used)	5 to 100 mm (10 x 10 cm white paper)	5 to 300 mm (10 x 10 cm white paper)	20 to 900 mm (30 x 30 cm white paper)	5 to 100 mm (10 x 10 cm white paper)	5 to 300 mm (10 x 10 cm white paper)	20 to 900 mm (30 x 30 cm white paper)
Setting distance	—	—	30 to 100 mm (10 x 10 cm white paper)	40 to 300 mm (10 x 10 cm white paper)	150 to 900 mm (10 x 10 cm white paper)	30 to 100 mm (10 x 10 cm white paper)	40 to 300 mm (10 x 10 cm white paper)	150 to 900 mm (10 x 10 cm white paper)
Light source	Red LED				Infrared LED	Red LED		Infrared LED
Sensitivity adjustment	1-turn trimmer (230°)					Automatic calibration		
Response time	1.5 ms max.	1 ms max. (1.2 ms max. with alternate-frequency type, 2 ms max. with M65 only [1.])						
Operation mode	LIGHT-ON/DARK-ON (selectable by wiring)							
Indicators [3.]	Output: Orange LED, Stable operation: Green LED							
Digital monitor	—					7-segment 3-digit red LED		
Control output	NPN open collector 24 V; 100 mA or less; residual voltage 1 V or less PNP open collector 24 V; 100 mA or less; residual voltage 1 V or less							
Protective circuit	Reversed polarity protection, Overcurrent protection, Surge absorbe							
Power supply	12 to 24 VDC ±10%, Ripple (P-P) 10% max, Class2							
Current consumption	T: 24 mA max. R: 27 mA max.	34 mA max.	30 mA max.		38 mA max.	37 mA max.		45 mA max.
Enclosure rating	IP67							
Ambient light	Incandescent lamp: 5000 [5.] lux max., Sunlight: 20000 lux max							
Ambient temperature	-20 to +55°C (-4 to 158°F), No freezing							
Relative humidity	35 to 85%, No condensation							
Vibration	10 to 55 Hz, 1.5 mm double amplitude in X, Y and Z directions, 2 hours respectively							
Shock	1000 m/s^2 in X, Y and Z directions, six times each							
Housing material	Glass-fiber reinforced resin							
Weight (including 2-m cable)	T: Approx.50 g R: Approx.55 g	Approx. 55 g			Approx. 70 g	Approx. 55 g		Approx. 70 g

1. The alternate-frequency type is indicated by replacing "1" at the end of model name with "5". The models are PZ-M65, M15, M35, M75, V15 V35 and V75.
2. The detecting distance is obtained with the maximum sensitivity.
3. The transmitter of the PZ-M51 features a power indicator only.
4. The PNP-output type sensor is suffixed with P after the model name.
5. 3000 lux max for the PZ-M71P/V71P.

Slit plate+Polarizing filter (Options:A-4)

	Slit plate (Slit plate+Polarizing filter)			
Slit width (mm)	No slit	0.5	1	2
Detecting distance (mm)	4000	500(200)	1000(600)	2000(1300)
Target size (mm)	6 x 6	0.5 x 5	1 x 5	2 x 2

Hints On Correct Use

⚠ WARNING

- **This product is just intended to detect the object(s). Do not use this product for the purpose to protect a human body or a part of human body.**
- **This product is not intended for use as explosion-proof product. Do not use this product in a hazardous location and/or potentially explosive atmosphere.**

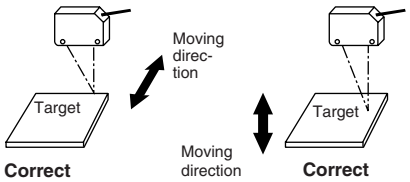
- To extend the cable length, use a cable with at least a 0.3 mm^2 nominal cross-section area. Limit the length of cable extension to no more than 100 m.
- If the amplifier cable is placed together with power lines or high voltage lines in the same conduit, a detection error may occur due to noise interference, or the sensor may be damaged. Isolate the amplifier cable from these lines.
- When using a commercially available switching regulator, ground the frame ground terminal and ground terminal.
- Do not use the PZ-V/PZ-M series outdoors or in a place where extraneous light can enter the light-receiving surface directly.
- When the multi-reflective type is used for the detection of a target with high reflectivity (e.g. mirror-surfaced object), proper detection or distance adjustment may be disabled. In such a case, tilt the sensor head at some angle.
- During maximum sensitivity setting, the detecting distance may vary due to a difference in characteristics of each unit.
- Be sure to check that the wiring is properly established. Improper wiring may cause a decrease in sensitivity or overheating and sensor damage. (See “I/O Circuit”.)
- To mount the sensor, use an M3 screw (coarse thread). Limit the tightening torque to 0.6 N•m or less.
- To mount PZ-M71/V71, use an M4 screw (coarse thread). Limit the tightening torque to 0.7 N•m or less.
- To attach the R-5 reflector, use an M3 screw (coarse thread). Limit the tightening torque to 0.3 N•m or less.
- The displayed value may vary depending on the surrounding environment, such as temperature change or dust.
- Use a stable power supply. The sensor cannot operate properly if the power supply is unstable at power-on or if the ripple exceeds the specified range.

Mutual Interference

- The alternate-frequency type allows mutual interference suppression up to two sensors.
- The alternate-frequency type is not available for the thrubeam type.
- To suppress the mutual interference with the thrubeam type or with three or more sensors, contact KEYENCE.

Sensor Head Orientation

To detect a moving target, consider orientation of the sensor head according to the direction of the movement.



If you want to mount the sensor head in an orientation other than the above, contact KEYENCE.

WARRANTY

KEYENCE products are strictly factory-inspected. However, in the event of a failure, contact your nearest KEYENCE office with details of the failure.

1. WARRANTY PERIOD

The warranty period shall be for one year from the date that the product has been delivered to the location specified by the purchaser.

2. WARRANTY SCOPE

(1) If a failure attributable to KEYENCE occurs within the abovementioned warranty period, we will repair the product, free of charge. However, the following cases shall be excluded from the warranty scope.
- Any failure resulting from improper conditions, improper environments, improper handling, or improper usage other than described in the instruction manual, the user’s manual, or the specifications specifically arranged between the purchaser and KEYENCE.
- Any failure resulting from factors other than a defect of our product, such as the purchaser’s equipment or the design of the purchaser’s software.
- Any failure resulting from modifications or repairs carried out by any person other than KEYENCE staff.
- Any failure that can certainly be prevented when the expendable part(s) is maintained or replaced correctly as described in the instruction manual, the user’s manual, etc.
- Any failure caused by a factor that cannot be foreseen at a scientific/technical level at the time when the product has been shipped from KEYENCE.
- Any disaster such as fire, earthquake, and flood, or any other external factor, such as abnormal voltage, for which we are not liable.

(2) The warranty scope is limited to the extent set forth in item (1), and KEYENCE assumes no liability for any purchaser’s secondary damage (damage of equipment, loss of opportunities, loss of profits, etc.) or any other damage resulting from a failure of our product.

3. PRODUCT APPLICABILITY

KEYENCE products are designed and manufactured as general-purpose products for general industries.
Therefore, our products are not intended for the applications below and are not applicable to them. If, however, the purchaser consults with us in advance regarding the employment of our product, understands the specifications, ratings, and performance of the product on their own responsibility, and takes necessary safety measures, the product may be applied. In this case, the warranty scope shall be the same as above.
- Facilities where the product may greatly affect human life or property, such as nuclear power plants, aviation, railroads, ships, motor vehicles, or medical equipment
- Public utilities such as electricity, gas, or water services
- Usage outdoors, under similar conditions or in similar environments

E 1040-1

KEYENCE CORPORATION
1-3-14, Higashi-Nakajima, Higashi-Yodogawa-ku,
Osaka, 533-8555, Japan
PHONE: +81-6-6379-2211 www.keyence.com

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Printed in Japan

MFS FEED SYSTEM/BOWL SET UP/CHECK OUT

JOB No. 2678-A DATE: 1-21-14

BOWL:

BOWL ROTATION: CCW BOWL SIZE: 18" BOWL O.D. 28" COILS: 2
VOLTAGE: 120V BOWL FREQUENCY: _____Hz. 60 Hz. _____ 120 Hz. X BOWL AMPLITUDE: 64
COIL GAP: _____ BACK PRESSURE: _____ MFS REFERENCE JOB No. _____
BOWL SPRINGS: #1 4(1/4") #2 4 (1/4") #3 4 (1/4") #4 4 (1/4") #5 _____ #6 _____
#7 _____ #8 _____ #1 IS SPRING BANK CLOSEST TO THE DISCHARGE, FOLLOW BOWL ROTATION AROUND.
DISCHARGE HEIGHT: 13.5 DISCHARGE LENGTH: 5" CENTERLINE: 11" PAN WIDTH: 4.5"
PAN WALL HEIGHT: 3.0" ORIENTING ANGLE: 45° ANGLE WIDTH: 2.25" COATING TYPE /COLOR RAL7035
QUICK DUMP: NO COUNTER WEIGHT: YES PART PROBLEMS: _____
_____ AVERAGE RATE COUNTS: 1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____
7. _____ 8. _____ 9. _____ 10. _____ REQUIRED RATE: 50 PPM

INLINE TRACK:

TRACK LENGTH: 28" TRACK MATERIAL: T.S. _____ STNLS. X PLASTIC: _____ CONFINEMENT MAT'LL: _____
VOLTAGE: 120V INLINE FREQUENCY: _____Hz. 60 Hz. X 120 Hz. _____ TRACK AMPLITUDE: 70
INLINE SPRINGS: #1 2 TK _____ #2 1 TK 1TN #3 _____ #4 _____ #5 _____ #6 _____
#1 IS THE REAR SPRING BANK CLOSEST TO THE DISCHARGE.

GRAVITY TRACK:

TRACK LENGTH: _____ TRACK MATERIAL: T.S. _____ STNLS. _____ PLASTIC _____ COATING: _____
TRACK ANGLE: _____ CANTED ANGLE: _____ "L" TRACK HORIZONTAL DISCHARGE LENGTH: _____

HOPPER:

HOPPER SIZE: 3 CUBE HOPPER TYPE: S.F. _____ STD. X L.P. _____
HOPPER MATERIAL: STNLS. X CRS. _____ HOPPER LINING: _____ INSIDE OF BUCKET PAINTED: _____
VOLTAGE: 120V HOPPER FREQUENCY: _____Hz. 60 Hz. X 120 Hz. _____ HOPPER AMPLITUDE: 73
HOPPER SPRINGS: #1 4 #2 5 #3 1 #4 1

BOWL LEVEL:

P.E. ANGLE: 90° ON DELAY: 7 OFF DELAY: .1 L.O. X D.O. _____ PNP NPN
SENSOR MODEL: KEYENCE PZV-32P CUSTOMER SUPPLIED: _____

SHUT OFF:

P.E. ANGLE: 45° ON DELAY: 1.0 OFF DELAY: 3.5 L.O. X D.O. _____ PNP NPN
SENSOR MODEL: FU-77G WITH FS-N11CP AMPLIFIER CUSTOMER SUPPLIED: _____

TRACK GAP: DISCHARGE TO TRACK: .040 TRACK TO NEST/ESCAPMENT: _____.

FLOWMETER SETTINGS AT P.S.I. PRESSURE:

1. _____ 2. _____ 3. _____ 4. _____ 5. _____ 6. _____ 7. _____ 8. _____
9. _____ 10. _____ 11. _____ 12. _____ 13. _____ 14. _____ 15. _____
16. _____ 17. _____ 18. _____ 19. _____ 20. _____

CHECKED OUT BY: SCOTT MILLER CLOCK No. 004 SUPERVISOR: _____

SYSTEM RUN OFF CERTIFICATION

I Certify, this Miller's Feeding System Inc. feed system has been tested and meets the standard MFS run off criteria as follows:

- ☐ *This system has been set up and run for a minimum of (1) hour or, the customers required run time, with an escapement, shuttle, or other escapement mechanism to simulate as closely as possible, the actual stop and start running conditions and feed rate as specified by the customer.*
- ☐ *This system has run issue free and jam free for a minimum of (1) hour with the exception of a damaged or defective part.*
- ☐ *Every effort has been made to cycle and operate this system as a complete system, with a full hopper (*) with the parts level in the bowl automatically metered, fed through the feeder bowl, through the track and escaped back into bulk.*
- ☐ *All sensors have been set, tested and verified to function as designed.*
- ☐ *All control and air settings have been recorded.*
- ☐ *All mechanical and electrical drawings as well as solid models have been updated.*
- ☐ *All documentation from purchased items is included in the documentation package.*
- ☐ *Instruction manual and documentation package has been printed, saved electronically by the MFS job number.*
- ☐ *The system has been photographed and a video has been recorded.*

Signed _____ *Date* _____

Notes: _____

_____

_____

_____

_____

☐ *(*) Customer did not supply an adequate quantity of parts to completely fill the hopper and system to normal full operating conditions.*