WIKA INSTRUMENT CORPORATION

Instruction Manual

HIGH PRECISION PORTABLE

PNEUMATIC CALIBRATOR

SERIES 65-120

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PLEASE NOTE: THIS EQUIPMENT HAS BEEN DESIGNED TO PROVIDE RELIABLE SERVICE; HOWEVER, BEFORE ATEMPTING TO INSTALL, OPERATE OR SERVICE THE EQUIPMENT, THIS INSTRUCTION MANUAL MUST BE READ, UNDERSTOOD AND OBSERVED. FAILURE TO DO SO CAN RESULT IN IMPROPER OPERATION WITH POSSIBLY HAZARDOUS CONSEQUENCES.

VERY IMPORTANT SAFETY PRECAUTIONS

This page titled "Very Important Safety Precautions" provides in brief, information of urgent importance relative to safety in the INSTALLATION, OPERATION & MAINTENANCE of this equipment.

WARNING

TO AVOID POSSIBLE SEVERE PERSONAL INJURY OBSERVE THE FOLLOWING PRECAUTIONS:

THE PRESSURE APPLIED TO THE INSTRUMENT CASE SHOULD NOT EXCEED 35 PSIG. PRESSURE ABOVE THIS LEVEL CAN RUPTURE THE GLASS DIAL COVER.

DO NOT APPLY PRESSURE IN EXCESS OF 90 PSI TO THE FILTER. GAUGES WITH RANGES ABOVE 30 PSI MUST USE A FILTER WITH A 175 PSI RATING.

FOR GAUGE USED WITH OXYGEN OR OTHER FLUIDS/GASES THAT REACT TO OIL, DO NOT USE OIL TO MOISTEN FILTER WHEN CLEANING.

DO NOT DISCARD THIS INSTRUMENT BOOK UPON COMPLETION OF INSTALLATION. INFORMATION PROVIDED IS ESSENTIAL TO PROPER AND SAFE OPERATION AND MAINTENANCE.

ADDITIONAL OR REPLACEMENT COPIES OF THIS INSTRUCTION BOOK ARE AVAILABLE FROM:

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NOTE

Minor part number changes may be incorporated into WIKA products from time to time that are not immediately reflected in the Instruction Book. When such a change has been made in your equipment and does not appear to be reflected in your Instruction Book, contact your local WIKA sales office for information.

Please include the equipment serial number in all correspondence, as it is essential for effective communication and proper equipment identification.

PORTABLE PNEOMATIC CALIBRATOR

DESCRIPTION

This Instruction Book describes installation, operation and maintenance instructions for the WIKA 65-120 Portable Pneumatic Calibrator. This equipment is designed primarily for field checking and calibration of pneumatic controls and instrumentation. In most cases the gauge, recorder or other pneumatic device being checked need not be removed from its mounting or operating location.

> **WARNING:** TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR DAMAGE TO THE EQUIPMENT THROUGH MISUSE, THIS EQUIPMENT SHOULD BE INSTALLED, OPERATED AND SERVICED ONLY BY TRAINED, QUALIFIED PERSONNEL WHO ARE THOROUGHLY FAMILIAR WITH THE ENTIRE CONTENTS OF THIS INSTRUCTION BOOK.

The Series 65-120 Calibrator consists of a carrying case containing an aluminum panel on which are mounted a precision pressure gauge, a selector valve, two precision pressure regulators, an air filter, and a connection block. A graphic flow diagram on the panel shows clearly all connections between the various units.

> **WARNING:** IMPROPER USE OF THIS GAUGE MAY CAUSE EXPLOSION AND PERSONAL INJURY. READ INSTRUCTION BOOK BEFORE USING THIS EQUIPMENT.

The following general and safety related information on the installation and use of pressure gauges should be followed. ASME B40.100 latest standards should be referenced as a guideline. A complete standard may be obtained from the AMERICAN SOCIETY OF MECHANICAL ENGINEERS; ASME, Three Park Avenue, New York, NY 10016-5990,800-843-2763 (US/Canada), 973-882-1170 (outside North America), website: www.asme.org.

1 PRESSURE GAUGE

The gauge has an accuracy of 1 part in 1500 of full scale range. The gauge has a dual scale with ranges from -100 inches of water to +850 inches of water and -3.6 psi to 30.6 psi. Other gauges with ranges to 100 psi are also available.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY THE PRESSURE APPLIED TO THE INSTRUMENT CASE SHOULD NOT EXCEED 35 PSIG. PRESSURE ABOVE THIS MAY RUPTURE THE GLASS DIAL COVER.

2 SELECTOR VALVE

The selector valve permits only one of any three pressures to be applied to the pressure connection in the gauge. A fourth position permits venting pressure from the gauge to atmosphere.

3 AIR FILTER

The air filter mounted under the panel is easily replaceable and protects the various components if the air supply is of less than instrument air quality.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY, DO NOT APPLY PRESSURE IN EXCESS OF 90 PSI TO THE FILTER. GAUGES WITH RANGES ABOVE 30 PSI MUST USE A FILTER WITH A 175 PSI RATING.

4 PRECISSION PRESSURE REGULATORS

The two precision pressure regulators accept supply air pressure through the filter and regulate the output. These are used in applying known pressures to pneumatic control devices.

5 ACCESSORIES

Furnished with the calibrator are six connectors P52409 and six nuts P34439 for 1/8-inch pipe thread to 1/4-inch OD plastic tubing and 20 feet of 1/4-inch OD plastic tubing RP684441.

6 CASE

The cover inside the carrying case may be removed for convenience.

CARE OF INSTRUMENT

This calibrator is a precision instrument. It has been constructed as ruggedly as the service for which it is intended will permit. Every precaution has been taken to prevent it from getting out of adjustment when subjected to vibration and shock. In an instrument as sensitive as this, delicate parts must be used. In view of this, the instrument should be handled with care and protected against violent and sudden jolts.

This instrument mechanism does not require oil.

This instrument is intended for use with dry non-corrosive gas.

OPERATION OF INSTRUMENT

EXERCISING

When using an aneroid indicator for precise calibrating purposes, due consideration must be given to the effect of hysteresis. Before using this instrument, apply pressure to the full range, allowing two minutes and then release allowing the pointer to return to zero. This exercising procedure minimizes the hysteresis effect. Repeat twice. Note that the instrument is calibrated on increasing pressure.

READING

There is a label on the panel which indicates whether the instrument should be read with the dial horizontal or vertical. However, because the mechanism is carefully balanced, position error may be neglected except when very precise calibrating work is being done. This slight position error may be easily determined by reading the instrument in both positions and noting the difference. To eliminate parallax and read the instrument correctly, place the eye so that the pointer and its image coincide.

CALIBRATING ADJUSTMENT

Note that the accuracy tolerance is the same at all points on the scale. Therefore, the pointer of a gauge pressure instrument is not necessarily at an exact zero when the instrument is shipped from the factory. However, the deviation is never outside the guaranteed accuracy as shown in the table PERFORMANCE CAPABILITY.

A label affixed to the panel indicates the deviation from zero when the instrument was adjusted to attain optimum accuracy over the full scale. This figure was obtained after the instrument was exercised as described in the preceding paragraph titled: Exercising.

If, after the instrument has been exercised, the pointer deviation is as specified, no adjustment is necessary. A slight discrepancy may be corrected by adjusting the pointer as described below.

A complete check of calibration of an instrument requires that it be exercised as above and compared with a standard having verified accuracy at least five times greater and a scale comparable in length to the instrument being checked. The standard must be corrected for all its inherent errors and must be corrected to standard conditions of gravity (980.665 cm/sec^2) and temperature (0^{o}C for mercury columns or 20^{o}C for water columns) where applicable.

While aneroid instruments are not subject to changes in reading due to gravity, they are affected by temperature. WIKA HIGH PRECISION instruments are read directly in terms of standard conditions (see preceding paragraph) at the temperature 23°C unless otherwise indicated. If the calibration check is conducted at 23 °C, the effect of temperature on the WIKA HIGH PRECISION instrument need not be considered. At any other temperature, the temperature effect listed in the table PERFORMANCE CAPABILITY must be considered. Note that this is not a **correction factor** but, rather, a tolerance that must be added to other tolerance being checked. When readings are taken on increasing pressures, they should fall within the specified accuracy tolerance given in the table. The difference between the upscale reading and the down-scale reading is the hysteresis error and should fall within the specified limits.

SETTING THE POINTER

If a calibration check shows the readings on increasing pressures at various points over the entire range are out by the same angular distance, the pointer may be rezeroed. Adjustment is limited to a pointer movement of about 10 degrees.

Access to the pointer zero adjustment screw is obtained by removing a screw in the back of the case.

If the error is not linear and cannot be corrected with a simple pointer adjustment, the gauge should be returned to the factory for repair and/or recalibration.

WIKA maintains a fully equipped service center staffed with trained personnel to repair and recalibrate WIKA instruments.

Precautions

A. Do not subject the instrument to pressure beyond its range. This can easily be controlled by proper setting of the air regulator. A pressure relief valve (36, 37 or 43) has been installed to protect the mechanism in the event of any air regulator failure. These relief valves are set to relieve at approximately 15% above full scale and will protect the mechanism for overpressure up to three times full scale range.

B. Unless wide temperature changes are experienced, the effect of temperature may be neglected. Do not install the instrument near a source of heat or cold. Temperature allowance equals 0.1 percent of full scale per 10^{o} Centigrade change from calibration temperature of 23^{o}C. Temperature allowance represents the maximum possible error due to temperature. Because the actual error is usually much less, temperature allowance is not a correction factor.

C. DO NOT use for liquid service.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY DO NOT APPLY PRESSURE GREATER THAN THE MAXIMUM CASE PRESSURE. THE MAXIMUM PRESSURE WHICH MAY SAFELY BE APPLIED TO THE INSTRUMENT CASE IS 35 PSIG. ("S" CONNECTION) A RELIEF VALVE ON THE GAUGE CASE WILL PROTECT THE CASE FROM APPLIED PRESSURE UP TO 10 TIMES THE MAXIMUM CASE PRESSURE RATING. HOWEVER, THIS VALVE IS AN EMERGENCY-PROTECTIVE DEVICE ONLY. PRECAUTIONS MUST BE TAKEN NOT TO APPLY PRESSURE GREATER THAN THE MAXIMUM CASE PRESSURE.

OPERATION

The details of some typical uses of the Portable Pneumatic Calibrator are given below.

A. Measurement of Pressure from External Sources

1. Connect the unknown pressure to connection marked P3. Leave S open to atmosphere.
2. Turn selector valve to position P3 and read the pressure on calibrator.

NOTE: For vacuum greater than 100 inches of water connect to S and leave P3 open to atmosphere.

B. Calibration of Pressure Gauges with Air

1. Connect AIR SUPPLY to a source of air pressure from zero to 90 psig.
2. Connect gauge to Pl or P2 with flexible tubing or, if gauge is small enough and has 1/8-inch NPT male thread, screw gauge directly into connection block at P1 or P2.
3. Turn handle of appropriate regulator counter-clockwise until spring in regulator is completely relaxed.
4. Turn handle of selector valve to appropriate position.
5. Turn on air supply; adjust pressure to desired value with regulator and compare gauge reading with calibrator reading.

C. Calibration of Pneumatic Recorders or Indicators

1. Connect air supply and recorder or indicator as in paragraph B1 or 2 above.
2. Proceed as in paragraph B3, 4 and 5 comparing recorder pen reading or indicator pointer reading with calibrator reading.

D. Measurement of Pressure Differentials from External Sources

1. Connect higher of two pressures to P3.
2. Turn selector valve handle to position P3.
3. Apply lower of two pressures to "S" and read difference in pressure on calibrator.
4. If two or three unknown pressures are to be compared to a reference pressure, the reference pressure would be connected to S, unless it is possible that the reference pressure can be more than 1 psi greater than one of the other pressures.
5. Assuming that the reference pressure is lower than the unknown pressures, the unknowns are connected one at a time to P3.
6. Apply one unknown pressure to the calibrator.
7. Turn on or apply reference pressure to "S" and read the difference on the calibrator.

CAUTION: Decrease reference pressure to zero or shut it off **before** shutting off or disconnecting pressure connection on P3.

E. Calibration of Pneumatic Controller in Which Applied Set and Variable Pressures Result in an Output Pressure Which is a Function on the other Two Pressures.

1. Connect AIR Supply to a source of air pressure not exceeding 90 psig.
2. Connect P1 to SET pressure connection on control device.
3. Connect P2 to PROCESS VARIABLE pressure connection on control device.

4. Connect OUTPUT connection on control device to P3.
5. Turn regulator handles counter-clockwise until spring in regulator is completely relaxed.
6. Turn on air supply.
7. Turn selector valve to position P1 and adjust Regulator 1 until SET pressure read on calibrator is value required by the particular device.
8. Turn selector valve to position P2 and using Regulator 2 set the PROCESS VARIABLE at some value near one end of the variable pressure range.
9. Turn selector valve to P3 and read the OUTPUT pressure resulting from action of P1 and P2 on controller.
10. Repeat Steps 8 and 9, as many times as desired to cover the range of PROCESS VARIABLE pressure.

F. Adjustment of Any Pneumatic Device in Which the Difference between Two Signals Should Be Zero or Some Value Not Exceeding the Range of the Calibrator.

1. Connect the two signals to P3 and S respectively with the higher pressure on P3.
2. Turn selector valve to P3.
3. Turn on the two signals simultaneously if possible. Otherwise turn on P3 first.

WARNING: TO AVOID POSSIBLE SEVERE PERSONAL INJURY OR EQUIPMENT DAMAGE, THESIGNAL APPLIED TO S CONNECTION MUST NOT EXCEED 35 PSI.

G. Measurement of Absolute Pressure

1. Connect vacuum pump to S and evacuate case. The gauge pointer will indicate pressure below atmosphere (vacuum) when the case has been evacuated.
2. Connect pressure to be measured to P3.
3. Turn selector valve to P3 and read absolute pressure.

NOTE: Additional absolute pressures may be measured at P1 and P2 if the regulators are by-passed with the tubing furnished.

H. Calibrating of Vacuum Gauges

1. Set selector valve to P3 and leave connection P3 open to atmosphere.
2. Install a tee in S connection and connect one leg to a vacuum source and the other to the gauges which are to be calibrated.
3. Install a shut-off valve at vacuum source. Tee into the line between this shut-off valve and the calibrator with a bleed valve.
4. Compare calibrator readings with the vacuum gauge readings.

SERVICE NOTES

Precision Pressure Regulator

The regulator is a Model GH-10-XT purchased as a unit from Conoflow Corp. WIKA does not stock parts for this regulator and if any are needed, the manufacturer should be consulted. Be sure to specify the range as stamped on the bottom of the regulator.

Air Filter

Replace air filter U28021 or FU4969 at regular intervals depending on the quality of the air supply and the frequency with which the calibrator is used. See label L1809 on Dwg.650.120.000.011 for recommendations.

Precision Pressure Gauge

Filter: Each instrument is furnished with a filter screwed into the pressure connections. The filter screen may occasionally require cleaning. This may be done as follows:

1. Remove the 1/8” NPT to1/4” tube elbows screwed into the gauge case pressure connections.
2. Unscrew the filter plug.
3. Clean the filter with detergent and hot water. Replace the filter.

Lubrication: The mechanism does not require oil. The oil will interfere with proper functioning and introduce serious errors.
DO NOT OIL THE MECHANISM.

PERFORMANCE CAPABILITY

SERIES	ACCURACY (1)	SENSITIVITY (1)	HYSTERESIS (1)	MAX TEMP EFFECT (2)
1500	0.066	0.01	0.1	0.1
1000	0.1	0.01	0.1	0.1
300	0.33	0.2	—	—

(1) %Full Scale. Full Scale is the difference between minimum and maximum dial reading. Full Scale of an instrument with a calibrated range of 0 to 800 mm Hg is 800 Hg where as Full Scale of an instrument with a calibrated range of 390 to 800 mm is 410 mm Hg.

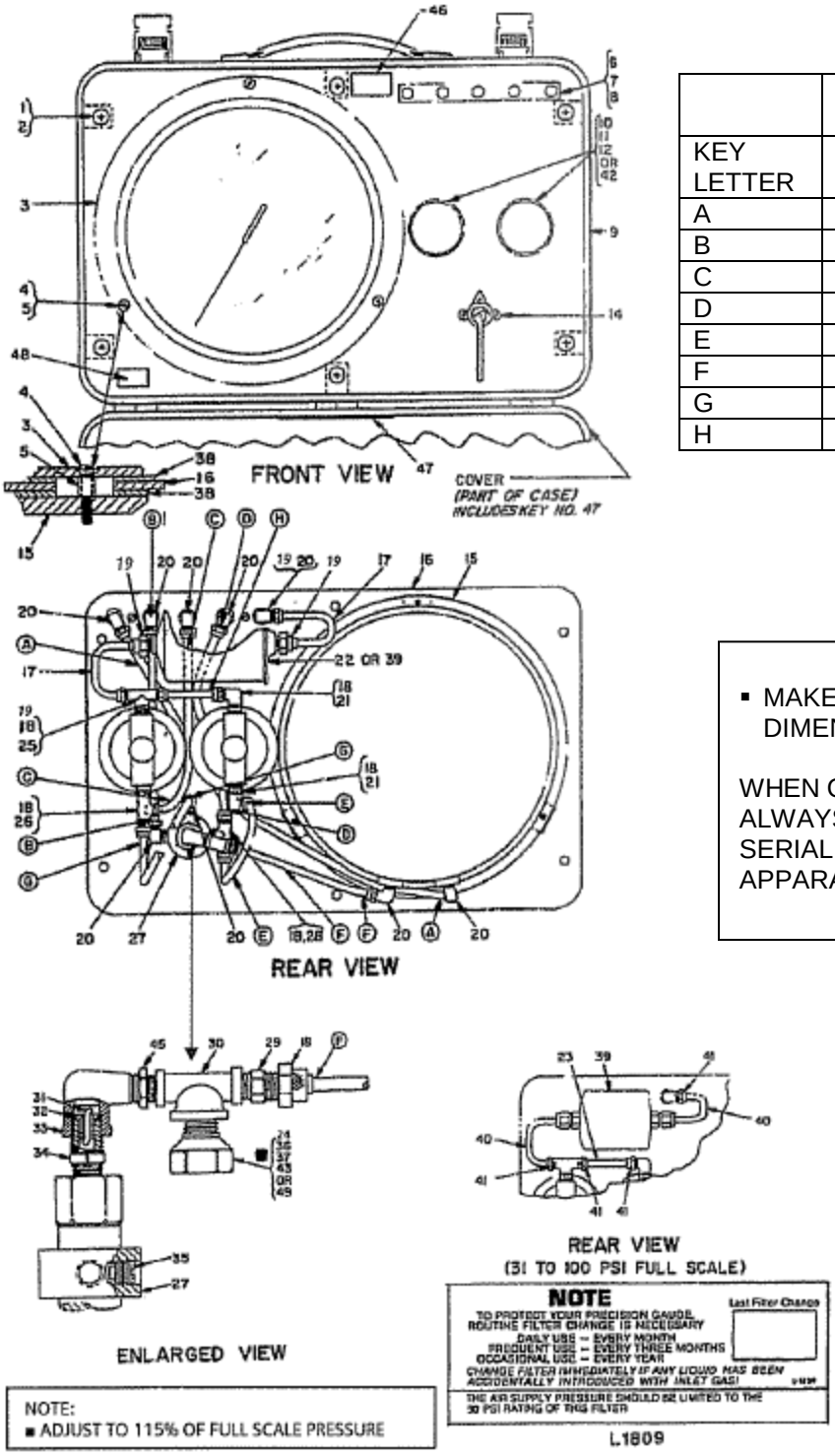
(2) %Full Scale per 10°C from 23°C.

WARRING LABELS AND TAGS

The following warning labels and tags have been attached to the equipment and are listed below:

L2228: READ INSTRUCTION MANUAL BEFORE OPERATING, SERVICING OR CONNECTING THIS EQUIPMENT TO A PRESSURE SOURCE.

L2295: TO PREVENT POSSIBLE PERSONAL INJURY FROM ELECTRICAL SHOCK OR HIGH TEMPERATURE, AVOID CONTACT WHEN POWER IS ON.



NOTE:
- ADJUST TO 115% OF FULL SCALE PRESSURE

	¼" 0.D. Plastic Tubing RP-684441	
KEY LETTER	LENGTH (INCH)	LENGTH (mm)
A	17"	440
B	7"	185
C	8"	200
D	7"	185
E	8"	200
F	4"	100
G	8"	200
H	2 1/8"	55

- MAKES UP U-23884 OVERALL DIMENSIONS: 18" x 7" x 12 1/2",

WHEN ORDERING MATERIAL ALWAYS SPECIFY MODEL AND SERIAL NUMBER OF APPARATUS

				Full Scale Pressure			
Key No.	Part No.	Qty	Description	5 psi to 30.6 psi 130" to 850" H2O	0 to 125" H2O	31 to 60 psi	61 to 100 psi
1	P43283	6	MACH SCREW (TRUSS HD S.S. ¼"- 20 X ½")	x	x	x	x
2	P56002	6	RETAINING NUT (TYPE J) ¼"-20 UNC-2B ST NI PLTD	x	x	x	x
3	—	1	GUAGE (NOT PART OF ASSEMBLY)	—	—	—	—
4	PN 4417	3	MACHINE SCREW SCR #8 32 X 1"	x	x	x	x
5	P47333	3	SPACER	x	x	x	x
6	FP9923	1	AIR CONNECTOR MANIFOLD	x	x	x	x
7	P6938	2	MACHINE SCREW SCR #10 32 X 7/16"	x	x	x	x
8	P13619	2	10# LOCKWASHERS S.S.	x	x	x	x
9	FU4876F	1	CASE	x	x	x	x
10	U18713	2	AIR REGULATOR (0 TO 35 PSI)	x			
11	UXA18713	2	AIR REGULATOR (0 TO 5 PSI)		x		
12	UXB18713	2	AIR REGULATOR (0 TO 60 PSI)			x	
14	PN3774	2	SCREW 8-32 X 3/8 " FLAT HEAD BR.	x	x	x	X
15	FP9924	1	BRACKET RING	x	x	x	X
16	FP9925G	1	PANEL	x	x	x	X
17	FP10313	2	WT TUBING OD1/4X0.035" BEND 2.065" CU	x	x		
18	P34439	16	POLY-FLO BRASS NUT AND SLEEVE 1/4T PLASTIC	x	x	x	x
19	UXB93943	4	NUT AND BRASS SLEEVE	x	x	x	x
20	P52410	9	90" ELBOW 1/8 " PIPE X ¼" TUBE	x	x	x	x
21	P52413	2	90" ELBOW ¼" PIPE X ¼" TUBE	x	x	x	x
22	U28021	1	AIR FILTER UNIT (GUAGES 0 TO 30 PSI)	x	x		
23	FP9920	1	TUBE (61 X 100 PSI)			x	x
24	FUXA4620	1	RELIEF VALVE (5 TO 15 PSI)	x			
25	P52414	1	TEE, ¼" TUBE X ¼" TUBE X ¼" PIPE	x	x	x	x
26	P52407	1	TEE, ¼" TUBE X ¼" PIPE X ¼" TUBE	x	x	x	x
27	U20030	1	SHUT-OFF VALVE (4 WAY)	x	x	x	x
28	P52411	1	TEE, ¼" TUBE X ¼" TUBE X ¼" PIPE	x	x	x	x
29	P52412	1	MALE CONNECTOR 1/4" PIPE X ¼ " TUBE	x	x	x	x
30	P91756	1	TEE, 1/8" PIPE X 1/8" PIPE X ¼" TUBE	x	x	x	x
31	RC682080	½" (16mm)	AIR GUAGE COPPER WIRE	x	x	x	x
32	PXA38519	1	RESTICTOR PLUG BR	x	x	x	x
33	P42329	1	1/8" STREET ELBOW	x	x	x	x
34	P47942	1	ADAPTER HEX12X25.4MM 2X1/8NPT 1/4-28UNF-28 BR	x	x	x	x
35	FU3523	1	FILTER ASSY 3/8-27UNS-2A BR	x	x	x	x
36	FU4620	1	RELIEF VALVE (16 TO 35 PSI)	x			
37	FU4909	1	RELIEF VALVE (5 PSI)		x		
38	RK445005	3	EXT. RUBBER 3/8" X 3/8" MIN 10FT LONG	x	x	x	x
39	FU4969	1	AIR FILTER UNIT (GAUGE ABOVE 30 PSI) MAX 10 BAR 3/8 SAE			x	x
40	FU4970	2	TUBE AND NUT CU 3/8" X 1/4"			x	x
41	UXB93943	4	POLY-FLO BRASS NUT&SLEEVE 1/4T BR	x	x	x	x
42	UXC18713	2	AIR REGULATOR (0 TO 100 PSI)				x
43	FU4908	1	RELIEF VALVE (50 PSI) 1/4" NPT BR			x	
45	P94265	1	REDUCING BUSHING ¼ " PIPE X 1/8" PIPE	x	x	x	x
46	FP10046	1	SPECIAL INSTRUCTIONS LABEL	x	x	x	x
47	L1809	1	NOTE LABEL	x	x	x	x
48	L2326	1	WARNING LABEL	x	x	x	x
49	FU4917	1	RELIEF VALVE (60 TO 100 PSI)				x